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

Beyer Park

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

Engineer of Work:

Carl Fiorica, PE

Provide Wet Signature and Stamp Above Line

Prepared For:

Schmidt Design Group Inc.

1111 Sixth Avenue Suite 500

San Diego, CA 92101

619.236.1462

Prepared By:

BWE Inc.

9449 Balboa Avenue, Suite 270

San Diego, CA 92123

619.299.5550

Date:

August 21, 2018

Approved by: City of San Diego Date

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

Project Name: Beyer Park

Table of Contents

- Acronyms
- Certification Page
- Submittal Record
- Project Vicinity Map
- FORM DS-560: Storm Water Applicability Checklist
- FORM I-1: Applicability of Permanent, Post-Construction Storm Water BMP Requirements
- HMP Exemption Exhibit (for all hydromodification management exempt projects)
- FORM I-3B: Site Information Checklist for PDPs
- FORM I-4B: Source Control BMP Checklist for PDPs
- FORM I-5B: Site Design BMP Checklist PDPs
- FORM I-6: Summary of PDP Structural BMPs
- Attachment 1: Backup for PDP Pollutant Control BMPs
    - Attachment 1a: DMA Exhibit
    - Attachment 1b: Tabular Summary of DMAs (Worksheet B-1 from Appendix B) and Design Capture Volume Calculations
    - Attachment 1c: FORM I-7 : Worksheet B.3-1 Harvest and Use Feasibility Screening
    - Attachment 1d: Infiltration Feasibility Information(One or more of the following):
        - FORM I-8A: Worksheet C.4-1 Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions
        - Form I-8B: Worksheet C.4-2 Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions
        - Infiltration Feasibility Condition Letter
        - Worksheet C.4-3: Infiltration and Groundwater Protection for Full Infiltration BMPs
        - FORM I-9: Worksheet D.5-1 Factor of Safety and Design Infiltration Rate
    - Attachment 1e: Pollutant Control BMP Design Worksheets / Calculations
- Attachment 2: Backup for PDP Hydromodification Control Measures
    - Attachment 2a: Hydromodification Management Exhibit
    - Attachment 2b: Management of Critical Coarse Sediment Yield Areas
    - Attachment 2c: Geomorphic Assessment of Receiving Channels
    - Attachment 2d: Flow Control Facility Design

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

Acronyms

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

Certification Page

Project Name:
Permit Application

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

C64715

PE#

06/30/2019

Expiration Date

Carl M. Fiorica

Print Name

BWE Inc.,

Company

08/21/2018

Date

Engineer's Stamp

Project Name: Beyer Park

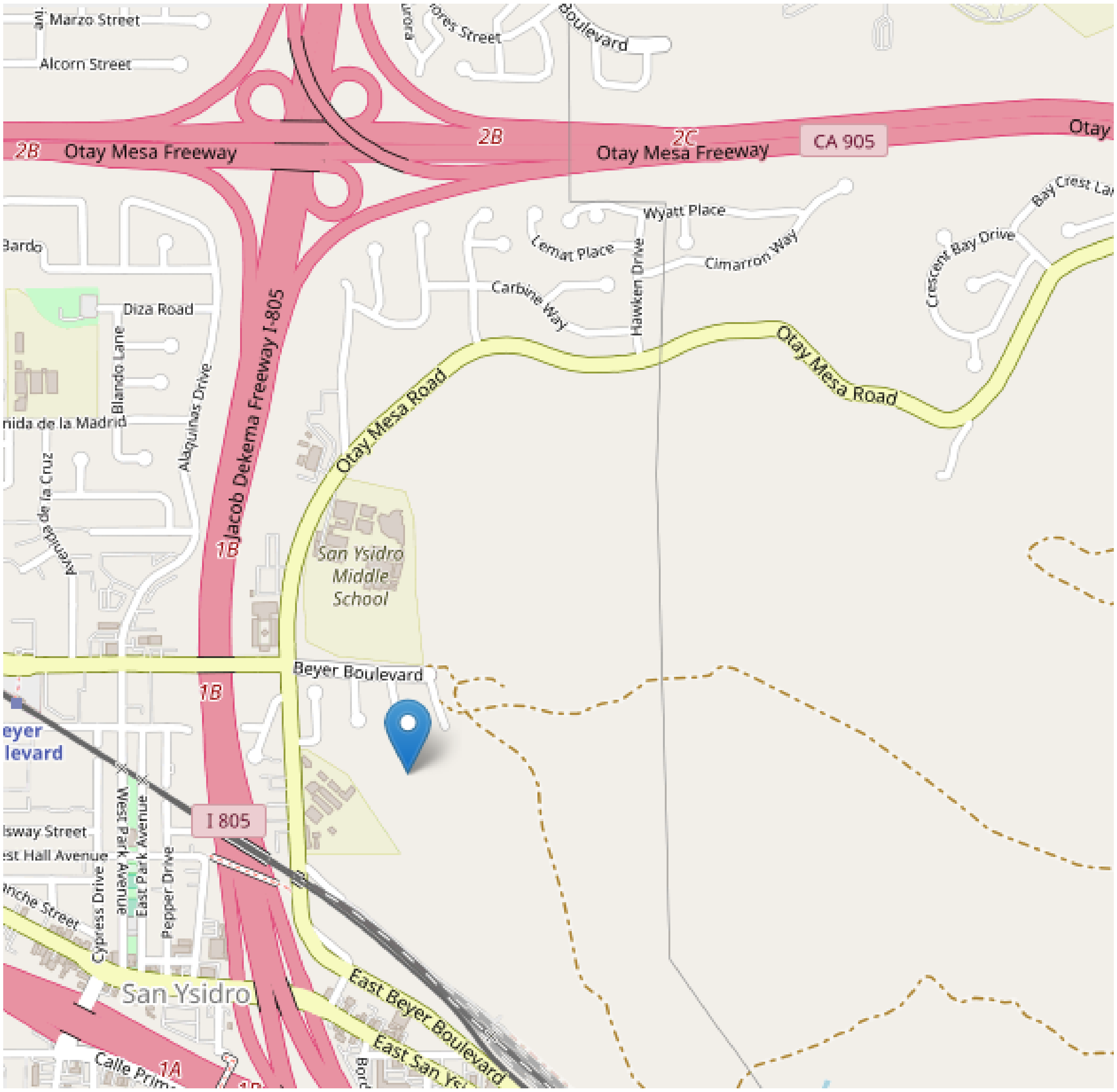
Submittal Record

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	08/21/2018	☑ Preliminary Design/Planning/CEQA ☐ Final Design	**Initial Submittal**
2		☑ Preliminary Design/Planning/CEQA ☐ Final Design	
3		☑ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Vicinity Map

Project Name: Beyer Park
Permit Application



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

Attach DS-560 form.

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

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

Storm Water Requirements Applicability Checklist

FORM
DS-560
October 2016

Project Address: Beyer Blvd and Enright Drive

Project Number *(for City Use Only)*:

SECTION 1. Construction Storm Water BMP Requirements:

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

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

PART A: Determine Construction Phase Storm Water Requirements.

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

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

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

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

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

☐ Yes; WPCP required, skip 4 ☐ No; next question

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

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

☐ Yes; no document required

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

☒ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

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

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

---

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

Clear Page 1

PART B: Determine Construction Site Priority

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

Complete PART B and continued to Section 2

1. ☐ **ASBS**

a. Projects located in the ASBS watershed.

2. ☒ **High Priority**

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

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

3. ☐ **Medium Priority**

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

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

4. ☐ **Low Priority**

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

SECTION 2. Permanent Storm Water BMP Requirements.

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

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

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

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

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

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

Clear Page 2

PART D: PDP Exempt Requirements.

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

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:

- **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
- **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
- **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

☐ Yes; PDP exempt requirements apply ☒ No; next question

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

☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

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

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

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

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

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

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

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

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

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

Clear Page 3

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

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

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

10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. ☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1. The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS**. ☐
2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐
3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management ☒

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

Clear Page 4

Clear Form

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: Beyer Park		
Permit Application Number:		Date:08/21/2018
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		
Step	**Answer**	**Progression**
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: Beyer Park

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: No critical coarse sediment yield areas are located on the project site. See the CCSYA exhibit in Attachment 2b.		

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Beyer Park
Project Address	Beyer Blvd and Enright Drive San Diego, CA 92173
Assessor's Parcel Number(s) (APN(s))	
Permit Application Number	
Project Watershed	Select One: ☐ San Dieguito River ☐ Penasquitos ☐ Mission Bay ☐ San Diego River ☐ San Diego Bay ☑ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	San Ysidro (911.11)
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	43.61 Acres (1,899,651 Square Feet)
Area to be disturbed by the project (Project Footprint)	16.01 Acres (697,311 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	2.71 Acres (118,027 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	13.30 Acres (578,863 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	N/A %

Project Name: Beyer Park

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 existing 43.6 Acre site is comprised of natural terrain with sparse vegetation.

Existing Land Cover Includes (select all that apply):

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

Description / Additional Information:

The site is comprised of natural terrain with sparse vegetation.

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:

Moody Canyon runs through the northern portion of the site but will not be disturbed.
Wetlands are present to the east and west of the project but will not be disturbed.

Project Name: Beyer Park

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 drainage conveyance is natural.

Offsite runoff is conveyed through the site but will bypass the disturbed areas.

The site runoff generally flows to the west and north. Stormwater runoff travels across the site via an existing small water courses, gullies and concrete ditches. Portions of the southwesterly area flows to an existing inlet in the terrace ditch prior to discharging offsite. Portions of the northwesterly area discharge to Filoi Avenue via an existing concrete ditch. The runoff from the northerly side of the site surface flows to Delany and Enright Avenues. Runoff from remainder of the area furthest north flows directly to Moody Canyon north of the disturbed area. Runoff from the site ultimately flows to the Pacific Ocean by way of the Tijuana River.

Discharge Location #1: The runoff originating from majority of the site area discharges offsite through discharge point 1. Discharge point 1 is situated at the southwesterly corner of the site. Easterly offsite area also discharges through this point.

Discharge Location #2: The runoff originating from northwesterly area discharges offsite through discharge point 2. Discharge point 2 is situated at the northwesterly corner of the site. The runoff discharges to Fioli Avenue via an existing concrete ditch.

Discharge Location #3: The runoff originating from site area discharges offsite through discharge point 3. Discharge point 3 is situated at the cul-de-sac at Delany Drive. The runoff discharges to this point via an existing concrete ditch.

Discharge Location #4: The runoff originating from northerly site area discharges offsite through discharge point 4. Discharge point 4 is situated at the cul-de-sac at Enright Drive. The runoff surface flows to this point via an existing water course.

Discharge Location #5: The runoff originating from discharges offsite through discharge point 5. Discharge point 5 is situated within the existing canyon and adjacent to cul-de-sac at Enright Drive. The runoff surface flows to this point via an existing water course. The runoff then discharges to Moody Canyon through this point.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The proposed improvements consist of construction of a park and associated improvements including underground utilities, hardscape, BMPs, and landscaping.

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

The proposed impervious features includes but are not limited to a skate park, asphalt parking areas, driveways, and concrete walkways.

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

The proposed previous features include stormwater BMPs, landscaping, playground areas, an athletic field, and a dog park.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

Project will include grading associated with the proposed park. The existing drainage pattern will be preserved to the maximum extent feasible.

Project Name: Beyer Park

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:

DMA #1 consists of the proposed dog park, sidewalks, and surrounding landscaping. This area drains to BMP #1 for pollutant and hydromodification control. This area discharges to POC #1.

DMA #2 contains a portion of the athletic field and drains to BMP #2 for pollutant control and BMP #1 for hydromodification control. This area discharges to POC #1.

DMA #3 contains a portion of the athletic field and drains to BMP #3 for pollutant and hydromodification control. This area discharges to POC #2.

DMA #4 contains landscaped slopes and decomposed granite (DG) trails. This is classified as a Self-Mitigating DMA as it contains less than 5% of impervious area and is hydraulically disconnected from surrounding DMAs.

DMA #5 is a Self-Mitigating area comprised of a landscaped slope on the perimeter of the project. This area contains less than 5% of impervious area and is hydraulically disconnected from surrounding DMAs.

DMA #6 contains landscaping and concrete sidewalks. This area flows to BMP #4 for pollutant and hydromodification control before discharging to POC #3.

DMA #7 contains landscaping, sidewalks, plaza areas, and a play area. This area flows to BMP #4 for pollutant and hydromodification control before discharging to POC #3.

Form I-6 Page 2 of

(Continued from page 1)

DMA #8 contains the western parking areas, driveways,and surrounding landscaping. These areas flow to a Proprietary Biofiltration BMP (BMP #9) for pollutant control followed by an underground vault (BMP #8) for hydromodification control. This DMA ultimately discharges to POC #3.

DMA #9 is the eastern parking area and driveway. This DMA flows to BMP #7 for pollutant and hydromodification control before discharging to POC #4.

DMA #10 contains the skate park, side walks, and surrounding landscaping. This DMA flows to BMP #7 for pollutant and hydromodification control before discharging to POC #4.

DMAs #11 and #12 are landscpaed areas on the project's perimeter. These areas contain less than 5% of impervious area are hydraulically disconnected from surrounding DMAs, and are therefore classified as self-mitigating DMAs.

In the proposed condition, the unmitigated peak flow rate due to the 100 year storm event is anticipated to increase by 10.55 cfs. The increase in peak flow rate in the unmitigated condition is mainly due to the increase in impervious area and runoff coefficient factor. See the Drainage Study for detailed flow rate calculations.

Project Name: Beyer Park

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):

☑Onsite storm drain inlets
☐Interior floor drains and elevator shaft sump pumps
☐Interior parking garages
☐Need for future indoor & structural pest control
☑Landscape/outdoor pesticide use
☐Pools, spas, ponds, decorative fountains, and other water features
☐Food service
☐Refuse areas
☐Industrial processes
☐Outdoor storage of equipment or materials
☐Vehicle and equipment cleaning
☐Vehicle/equipment repair and maintenance
☐Fuel dispensing areas
☐Loading docks
☐Fire sprinkler test water
☑Miscellaneous drain or wash water
☑Plazas, sidewalks, and parking lots

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)

Runoff from the site ultimately flows to the Pacific Ocean via the City's storm drain system, the Tijuana River, and Tijuana River Estuary.

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

Tijuana River: IND, RARE, REC1, REC2, WARM, WILD
Tijuana River Estuary: COMM, EST, IND, MAR, MIGR, RARE, REC1, REC2, SHELL, WILD
Pacific Ocean: AQUA, BIOL, COMM, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, SPWN, WILD

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

No Areas of Special Biological Significance (ASBSs) are located downstream of the project discharge location.

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

Tijuana River, 0.75 Miles southwest.

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

A MHPA is located on the project site, approximately 300 feet east of the grading limit.

Project Name: Beyer Park

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)
Tijuana River	Ammonia as Nitrogen	Sedimentation
	Benthic Community Effects	Tubidity
	Cadmium	
	Chlorpyrifos	
	Diazinon	
	Eutrophic	
	Low Dissolved Oxygen	
	Malathion	
	Pesticides	
	Phosphorus	

Identification of Project Site Pollutants*

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

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

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

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

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

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

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

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

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

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

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

☐ Yes

☑ No

Discussion / Additional Information:

No Critical Coarse Sediment Yield Areas exist within the project footprint.

Project Name: Beyer Park

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. Four POCs are considered for the hydromodification compliance purposes. POCs #1, #2, #3, and #4 are located south, west, northwest, and north of the disturbed areas.
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)

Project Name: Beyer Park

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.
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.

Project Name: Beyer Park

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 materials storage areas are 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 areas are proposed.			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Project Name: Beyer Park

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.

Project Name: Beyer Park

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:			
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: Trees will be planted across the site but are not designed to comply with 4.3.1. Vegetated areas within the site have been preserved to the maximum extent feasible.			

Form I-5B Page 2 of 4

Site Design Requirement	Applied?		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented: Impervious area is minimized to the maximum extent feasible. Landscaped planters are spread throughout the ground level sidewalks and elevated deck between the three proposed buildings.			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.5 not implemented: The site contains dispersion areas along the eastern property boundary.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☑ Yes	☐ No	☐ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☑ No	☐ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

Project Name: Beyer Park

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: Permeable pavement or green roofs are not implemented. Alternative BMPs such as biofiltration are used.			
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: The landscaped areas will be planted with native or drought tolerant species.			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: The demand for harvesting and using precipitation is less than 25% of the Site's Design Capture Volume (DCV).			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: Beyer Park

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

Project Name: Beyer Park

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.

Storm Water Pollutant Control BMP Selection Flow Charts (Figure 5-1 and 5-2) of the City of San Diego BMP Design Manual are utilized to select and size the pollutant control BMPs for this project. A feasibility study of all retention based BMPs (harvest and use, full infiltration) is performed prior to selecting the biofiltration BMPs to comply with the pollutant control requirements. It is determined that the harvest and use of precipitation is infeasible because the site has low water demand for irrigation and toilet flushing (less than 25% of the site's DCV).

The Design Capture Volume (DCV) is calculated for each drainage management area (DMA) considering 85th percentile, 24-hr rainfall depth of 0.46" for this site.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of 10
(Continued from page 1)

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 1

Construction Plan Sheet No.

Type of Structural BMP:
- ☐ Retention by harvest and use (e.g. HU-1, cistern)
- ☐ Retention by infiltration basin (INF-1)
- ☐ Retention by bioretention (INF-2)
- ☐ Retention by permeable pavement (INF-3)
- ☐ Partial retention by biofiltration with partial retention (PR-1)
- ☑ Biofiltration (BF-1)
- ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- ☐ Detention pond or vault for hydromodification management
- ☐ Other (describe in discussion section below)

Purpose:
- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☑ Combined pollutant control and hydromodification control
- ☐ Pre-treatment/forebay for another structural BMP
- ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 2

Construction Plan Sheet No.

Type of Structural BMP:

☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☑ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 2
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 3

Construction Plan Sheet No.

Type of Structural BMP:

☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☑ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 3
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 4

Construction Plan Sheet No.

Type of Structural BMP:

☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☑ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 4
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 5

Construction Plan Sheet No.

Type of Structural BMP:

☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☑ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 5
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 6

Construction Plan Sheet No.

Type of Structural BMP:
☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☑ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:
☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 6
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 7

Construction Plan Sheet No.

Type of Structural BMP:
☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☑ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:
☐ Pollutant control only
☐ Hydromodification control only
☑ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)

Structural BMP ID No. 7
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 8

Construction Plan Sheet No.

Type of Structural BMP:
☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☐ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☑ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:
☐ Pollutant control only
☑ Hydromodification control only
☐ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 8
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page 3 of 10 (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 9

Construction Plan Sheet No.

Type of Structural BMP:

☐ Retention by harvest and use (e.g. HU-1, cistern)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☐ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☑ Other (describe in discussion section below)

Purpose:

☑ Pollutant control only
☐ Hydromodification control only
☐ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	BWE/Carl Fiorica 9449 Balboa Avenue, Suite 270 San Diego, CA 92123 619-299-5550
Who will be the final owner of this BMP?	Parks and Recreation Department City of San Diego
Who will maintain this BMP into perpetuity?	Transportation and Storm Water Department City of San Diego
What is the funding mechanism for maintenance?	

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. 9
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Proprietary Biofiltration BMP (Modular Wetland)

Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

Project Name: Beyer Park

Indicate which Items are Included:

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

Project Name: Beyer Park

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

The DMA Exhibit must identify:

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

85th % Rainfall Depth= 0.46 inch

Tabular Summary of DMAs

Worksheet B-1

DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient (C)	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
#1	3.74	0.432	11.6%	D	0.193	1201	BMP #1	Biofiltration with Partial Retention	1
#2	1.27	0.033	2.6%	D	0.121	256	BMP #2	Biofiltration with Partial Retention	1
#3	2.92	0.103	3.5%	D	0.128	626	BMP #3	Biofiltration with Partial Retention	2
#4	0.60	0.000	0.0%	D	0.100	N/A	Self-Mitigating	Self-Mitigating	N/A
#5	0.67	0.000	0.0%	D	0.100	N/A	Self-Mitigating	Self-Mitigating	N/A
#6	0.40	0.031	7.7%	D	0.161	108	BMP #4	Biofiltration with Partial Retention	3
#7	1.33	0.287	21.5%	D	0.272	605	BMP #5	Biofiltration with Partial Retention	3
#8	0.93	0.561	60.6%	D	0.585	904	BMP #6	Proprietary Biofiltration	3
#9	1.33	0.458	34.3%	D	0.375	835	BMP #8	Biofiltration with Partial Retention	4
#10	1.61	0.553	34.3%	D	0.374	1007	BMP #6	Biofiltration with Partial Retention	4
#11	0.41	0.000	0.0%	D	0.100	N/A	Self-Mitigating	Self-Mitigating	N/A
#12	0.80	0.000	0.0%	D	0.100	133	Self-Mitigating	Self-Mitigating	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	HSG	Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
12	16.008	2.457	15.3%	D	0.223	5676	13.535		4

<u>Where</u>: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management

Attachment 1b:
Summary of DMAs and Design Capture Volume (DCV)

DMA	Total Area (AC)	Total Area (SF)	Landscape Area (SF)	DG Area (SF)	Impervious Area (SF)	% Impervious	DCV (CF) or Exception
1	3.74	162788	143957	0	18831	11.6%	1201
2	1.27	55424	53995	0	1429	2.6%	256
3	2.92	127254	122764	0	4490	3.5%	626
4	0.60	26238	24380	1858	0	0.0%	N/A
5	0.67	29110	29110	0	0	0.0%	N/A
6	0.40	17491	16147	0	1344	7.7%	108
7	1.33	57939	33506	962	23471	40.5%	605
8	0.93	40336	15904	0	24432	60.6%	904
9	1.33	58131	38172	0	19959	34.3%	835
10	1.61	70213	44541	1601	24071	34.3%	1007
11	0.41	17643	17643	0	0	0.0%	N/A
12	0.80	34744	34744	0	0	0.0%	133
Total	16.01	697311	574863	4421	118027	16.9%	5676

Attachment 1b:

Summary of BMPs

BMP	Tributary DMA #s	Min Bottom Area (SF)	Proposed Bottom Area (SF)	Freeboard (FT)	Ponding Depth (FT)	Mulch (FT)	Soil Media (FT)	Filter Coarse (FT)	Aggregate Base (FT)	Subdrain Diameter (FT)	Subdrain Offset (FT)	Subdrain Orifice (IN)
1	1	940	4290	0.5	0.67	0.25	1.5	0.5	2.00	0.67	0.25	1.70
2	2	201	600	0.5	0.50	0.25	1.5	0.5	1.00	0.67	0.25	1.00
3	3	490	1660	0.5	0.50	0.25	1.5	0.5	1.00	0.67	0.25	1.00
4	6	85	1600	0.5	0.67	0.25	1.5	0.5	1.00	0.67	0.25	0.50
5	7	743	1520	0.5	0.67	0.25	1.5	0.5	1.00	0.67	0.25	0.50
6	10	798	3230	0.5	1.00	0.25	1.5	0.5	3.00	0.67	0.25	0.48
7	9	653	700	0.5	0.67	0.25	1.5	0.5	2.00	0.67	0.25	0.80
8	8	Undergound Vault. Volume = 2940 CF										
9	8	Proprietary Modular Wetland System										

LEGEND

AC PAVEMENT (SDG-113)	▭
CONC. SIDEWALK	▨
NEW STORM DRAIN	———SD———
SUB DRAIN	— SD — — —
DRAINAGE PATH	→ → → → → → →
CONCRETE HEADWALL	◡
CATCH BASIN	■
MODULAR WETLAND	▨
DMA BOUNDARY	▪▪▪▪▪▪▪ ▬ ▪ ▬ ▬▬▬
EXISTING CONTOUR	— — XXX — —
NEW CONTOUR	— — XXX — — — — XXX — —
POINT OF COMPLIANCE	△1
DRAINAGE MANAGEMENT AREA MARKER & AREA (AC)	#1 X.XX

SWQMP NOTES

1. THE SITE IS COMPRISED OF HYDROLOGIC SOIL TYPE D.
2. NO CRITICAL COARSE SEDIMENT YIELD AREAS ARE PRESENT ON SITE.
3. DEPTH TO GROUNDWATER IS GREATER UNKNOWN, BUT ESTIMATED TO BE GREATER THAN 50 FEET.

50 25 0 50 100 150
SCALE: 1"=50'

BWE
WWW.BWESD.COM
619.299.5550

APPR	DATE	DESCRIPTION	SYM

PROJECT

BEYER PARK
SAN DIEGO, CA

SITE ADDRESS
BEYER BLVD AND ENRIGHT DR
SAN DIEGO, CA 92173

SHEET TITLE

DMA EXHIBIT

SHEET OF

ISSUE DATE: 08/21/2018
DRAWN BY:
CHECKED BY:
BWE JOB NUMBER:
CLIENT JOB NUMBER:
MUNICIPALITY PROJECT NUMBER:

PLOT: \\BWE-FIVE\CAD\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\EXHIBITS\SWQMP\12820U.1.00 DMAS-EXIB.DWG Malcolm D. Smith 8/21/2018 7:18 PM

Project: Beyer Park

DMA 1 (BMP #1)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	18,831	0.90	16,948	
Landscape	143,957	0.10	14,396	
DG	0	0.30	0	
Total	**162,788**		**31,344**	**0.193**

3.737 (Ac)

Project: Beyer Park

DMA 1 (BMP #1)

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	3.737	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.193	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**1202**	cubic-feet

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#1

Sizing Method for Pollutant Removal Criteria — Worksheet B.5-1

1	Area draining to the BMP	162,788	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.192542448	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1202	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	15	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.)	0.84	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	5.062479792	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	22.46247979	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1802	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	963	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]	901	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	621	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]	940	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	940	sq. ft.
23	Provided BMP Footprint	4290	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #1

BMP area (A) =	4290	sf	from line 23, Worksheet B.5-1
Cd =	0.61		
Head (H)=	15	inches	from line 7, Worksheet B.5-1

D :	1.7	inch	…..from HMP result for BMP #1
Q :	0.084	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	0.84	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

Project: Beyer Park

DMA 2 (BMP #2)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	1,429	0.90	1,286	
Landscape	53,995	0.10	5,400	
DG	0	0.30	0	
Total	**55,424**		**6,686**	**0.121**

1.272 (Ac)

Project: Beyer Park

DMA 2 (BMP #2)

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	1.272	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.121	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**256**	cubic-feet

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#2

Sizing Method for Pollutant Removal Criteria

Worksheet B.5-1

1	Area draining to the BMP	55,424	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.120626443	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	256	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	15	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.)	2.11	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	12.67877465	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	30.07877465	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	384	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	153	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]	192	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	133	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]	201	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	201	sq. ft.
23	Provided BMP Footprint	600	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #2

BMP area (A) =	600	sf	from line 23, Worksheet B.5-1
Cd =	0.61		
Head (H)=	15	inches	from line 7, Worksheet B.5-1

D :	1	inch	…..from HMP result for BMP #1
Q :	0.029	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	2.11	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

Project: Beyer Park

DMA 3 (BMP #3)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	4,490	0.90	4,041	
Landscape	122,764	0.10	12,276	
DG	0	0.30	0	
Total	**127,254**		**16,317**	**0.128**
	2.921 (Ac)			

Project: Beyer Park

DMA 3 (BMP #3)

Design Capture Volume		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=	2.921	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.128	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**626**	cubic-feet

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#3

Sizing Method for Pollutant Removal Criteria — Worksheet B.5-1

1	Area draining to the BMP	127,254	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.128227011	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	626	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	15	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.)	0.76	in/hr.
	Baseline Calculations		
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	4.582689633	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	21.98268963	inches
	Option 1 – Biofilter 1.5 times the DCV		
16	Required biofiltered volume [1.5 x Line 4]	938	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	512	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]	469	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	324	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]	490	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	490	sq. ft.
23	Provided BMP Footprint	1660	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #3

BMP area (A) = 1660 sf from line 23, Worksheet B.5-1
Cd = 0.61
Head (H)= 15 inches from line 7, Worksheet B.5-1

D :	1	inch	…..from HMP result for BMP #1
Q :	0.029	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	0.76	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

Project: Beyer Park

DMA 6 (BMP #4)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	1,344	0.90	1,210	
Landscape	16,147	0.10	1,615	
DG	0	0.30	0	
Total	**17,491**		**2,824**	**0.161**
	0.402 (Ac)			

Project: Beyer Park

DMA 6 (BMP #4)

	Design Capture Volume	**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=	0.402	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.161	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**108**	cubic-feet

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#4

Sizing Method for Pollutant Removal Criteria

Worksheet B.5-1

1	Area draining to the BMP	17,491	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.161471614	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	108	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	15	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.)	0.20	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	1.198838187	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	18.59883819	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	162	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	105	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]	81	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	56	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]	85	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	85	sq. ft.
23	Provided BMP Footprint	1600	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #4

BMP area (A) =	1600	sf	from line 23, Worksheet B.5-1
Cd =	0.61		
Head (H)=	15	inches	from line 7, Worksheet B.5-1

D :	0.5	inch	…..from HMP result for BMP #1
Q :	0.007	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	0.20	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

Project: Beyer Park

DMA 7 (BMP #5)

Area Weighted Runoff Factor (C)

Surface Type	**Area - A (sf)**	**C - Factor**	**C X A**	**Weighted C-Factor**
Impervious	23,471	0.90	21,124	
Landscape	33,506	0.10	3,351	
DG	962	0.30	289	
Total	**57,939**		**24,763**	**0.427**

1.330 (Ac)

Project: Beyer Park

DMA 7 (BMP #5)

	Design Capture Volume	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=	1.33	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.427	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**949**	cubic-feet

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#5

Sizing Method for Pollutant Removal Criteria — Worksheet B.5-1

1	Area draining to the BMP	57,939	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.427399506	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	949	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	15	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.)	0.21	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	1.261105259	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	18.66110526	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1424	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	916	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]	712	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	491	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]	743	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	743	sq. ft.
23	Provided BMP Footprint	1521	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #5

BMP area (A) =	1521	sf	from line 23, Worksheet B.5-1
Cd =	0.61		
Head (H)=	15	inches	from line 7, Worksheet B.5-1

D :	0.5	inch	…..from HMP result for BMP #1
Q :	0.007	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	0.21	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

Project: Beyer Park

DMA 8 (BMP #10)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	24,432	0.90	21,989	
Landscape	15,904	0.10	1,590	
DG	0	0.30	0	
Total	**40,336**		**23,579**	**0.585**

0.926 (Ac)

Project: Beyer Park

DMA 8 (BMP #10)

Design Capture Volume		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=	0.926	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.585	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**904**	cubic-feet

Project: Beyer Park

DMA 9 (BMP #8)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	19,959	0.90	17,963	
Landscape	38,172	0.10	3,817	
DG	0	0.30	0	
Total	**58,131**		**21,780**	**0.375**

1.335 (Ac)

Project: Beyer Park

DMA 9 (BMP #8)

Design Capture Volume		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=	1.335	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.375	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**835**	cubic-feet

The City of SAN DIEGO	**Project Name**	Beyer Park	
	BMP ID	#7	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	58,131	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.374676162	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	835	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	15	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.)	1.16	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	6.979155809	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	24.37915581	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1252	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	616	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]	626	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	432	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]	653	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	653	sq. ft.
23	Provided BMP Footprint	700	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #8

BMP area (A) =	700	sf	from line 23, Worksheet B.5-1
Cd =	0.61		
Head (H)=	15	inches	from line 7, Worksheet B.5-1

D :	0.8	inch	…..from HMP result for BMP #1
Q :	0.019	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	1.16	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

Project: Beyer Park

DMA 10 (BMP #6)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	24,071	0.90	21,664	
Landscape	44,541	0.10	4,454	
DG	1,601	0.30	480	
Total	**70,213**		**26,598**	**0.379**

1.612 (Ac)

Project: Beyer Park

DMA 10 (BMP #6)

	Design Capture Volume	**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=	1.612	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.379	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**1020**	cubic-feet

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#6

Sizing Method for Pollutant Removal Criteria | **Worksheet B.5-1**

1	Area draining to the BMP	70,213	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.37882301	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1020	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	15	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.)	0.09	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	0.54747925	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	17.4	inches
15	Total Depth Treated [Line 13 + Line 14]	17.94747925	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1529	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	1023	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]	765	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	527	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]	798	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	798	sq. ft.
23	Provided BMP Footprint	3230	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Equivalent Media Infiltration Rate With Outlet Control

BMP #6

BMP area (A) =	3230	sf	from line 23, Worksheet B.5-1
Cd =	0.61		
Head (H)=	15	inches	from line 7, Worksheet B.5-1

D :	0.48	inch	…..from HMP result for BMP #1
Q :	0.007	cfs	…..Q = Cd . A . {2g (H-D/2}^0.5
f_{eq}:	0.09	in/hr	…..f_{eq} = Q/A *(Unit Conversion)

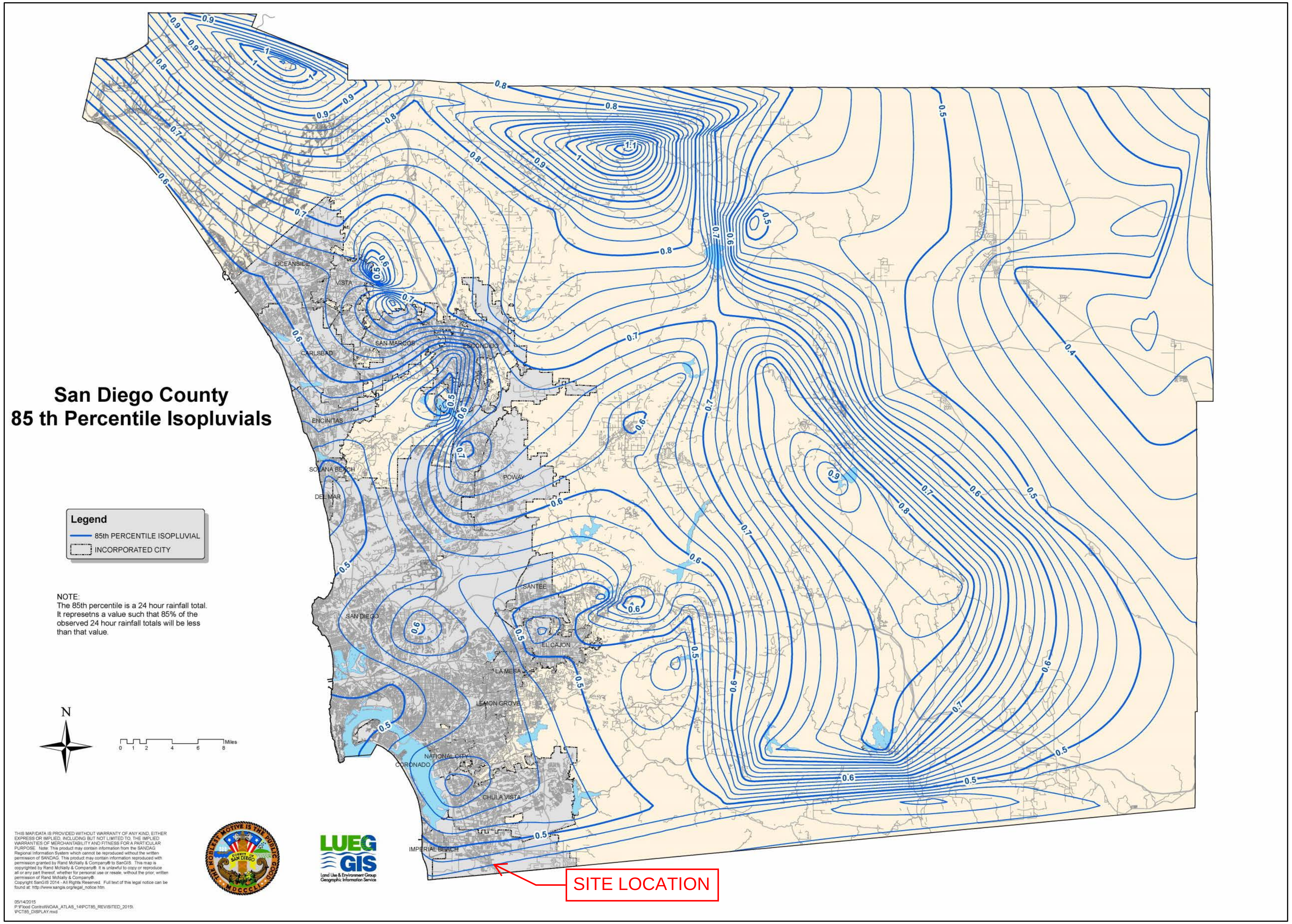


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#1

Sizing Method for Volume Retention Criteria | **Worksheet B.5-2**

1	Area draining to the BMP	162,788	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.192542448	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1202	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	28	cu. ft.

The City of SAN DIEGO

	Project Name	Beyer Park	
	BMP ID	#2	
	Sizing Method for Volume Retention Criteria	**Worksheet B.5-2**	
1	Area draining to the BMP	55,424	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.120626443	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	256	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	6	cu. ft.

The City of SAN DIEGO	Project Name	Beyer Park	
	BMP ID	#3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	

1	Area draining to the BMP	127,254	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.128227011	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	626	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	14	cu. ft.

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#4

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	17,491	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.161471614	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	108	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	2	cu. ft.

The City of
SAN DIEGO

Project Name	Beyer Park
BMP ID	#5

Sizing Method for Volume Retention Criteria — **Worksheet B.5-2**

1	Area draining to the BMP	57,939	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.427399506	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	949	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	22	cu. ft.

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#6

Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	70,213	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.37882301	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1020	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	23	cu. ft.

The City of SAN DIEGO

Project Name	Beyer Park
BMP ID	#7

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

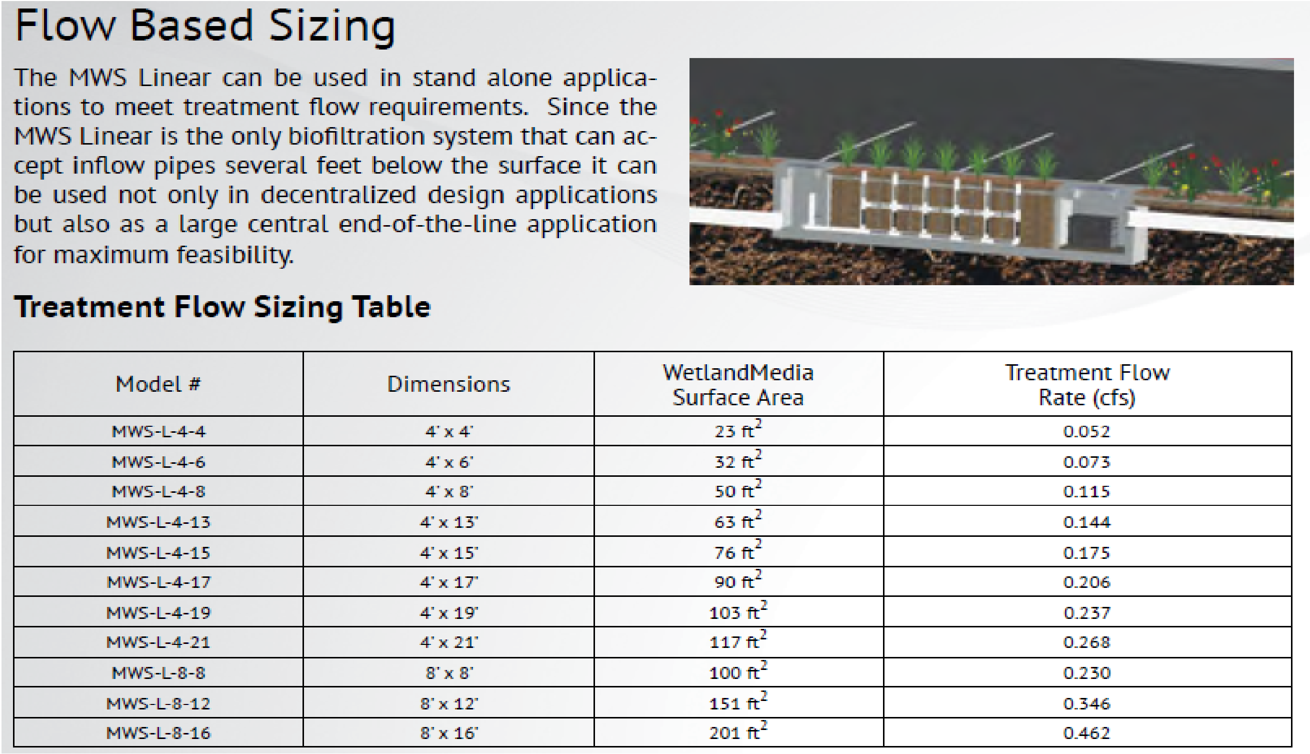
1	Area draining to the BMP	58,131	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.374676162	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	835	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	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]	19	cu. ft.

MWS Flow Based BMP Sizing

C=	0.95		Runoff coefficient
I_{TREAT} =	0.2	in/hr	Intensity of rainfall
Q_{TREAT} =	C x I_{TREAT} x A	cfs	Treatment flow rate

Design Flow (cfs) = 1.5* Q_{Treat}

BMP #	DMA		Q_{TREAT} (cfs)	BMP Sizing		
	Identifier	Area (ac)		Treatment Flow Rate (cfs)	Model	Size
9	8	0.93	0.177	0.265	MWS-L-8-12	8' X 12'



Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear 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.

Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

July 2017

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

For the

MWS-Linear Modular Wetland

Ecology's Decision:

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

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

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:
   - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
   - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
   - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.
5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

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

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.
   - Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
   - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
   - Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific

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

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

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

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

Application Documents:

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

Applicant's Use Level Request:

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

Applicant's Performance Claims:

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

Ecology Recommendations:

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

Findings of Fact:

<u>Laboratory Testing</u>

The MWS-Linear Modular wetland has the:

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

Field Testing

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

Issues to be addressed by the Company:

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

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

Contact Information:

Applicant:	Zach Kent BioClean A Forterra Company. 398 Vi9a El Centro Oceanside, CA 92058 *zach.kent@forterrabp.com*

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

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

Ecology:

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

Revision History

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

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: Beyer Park

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

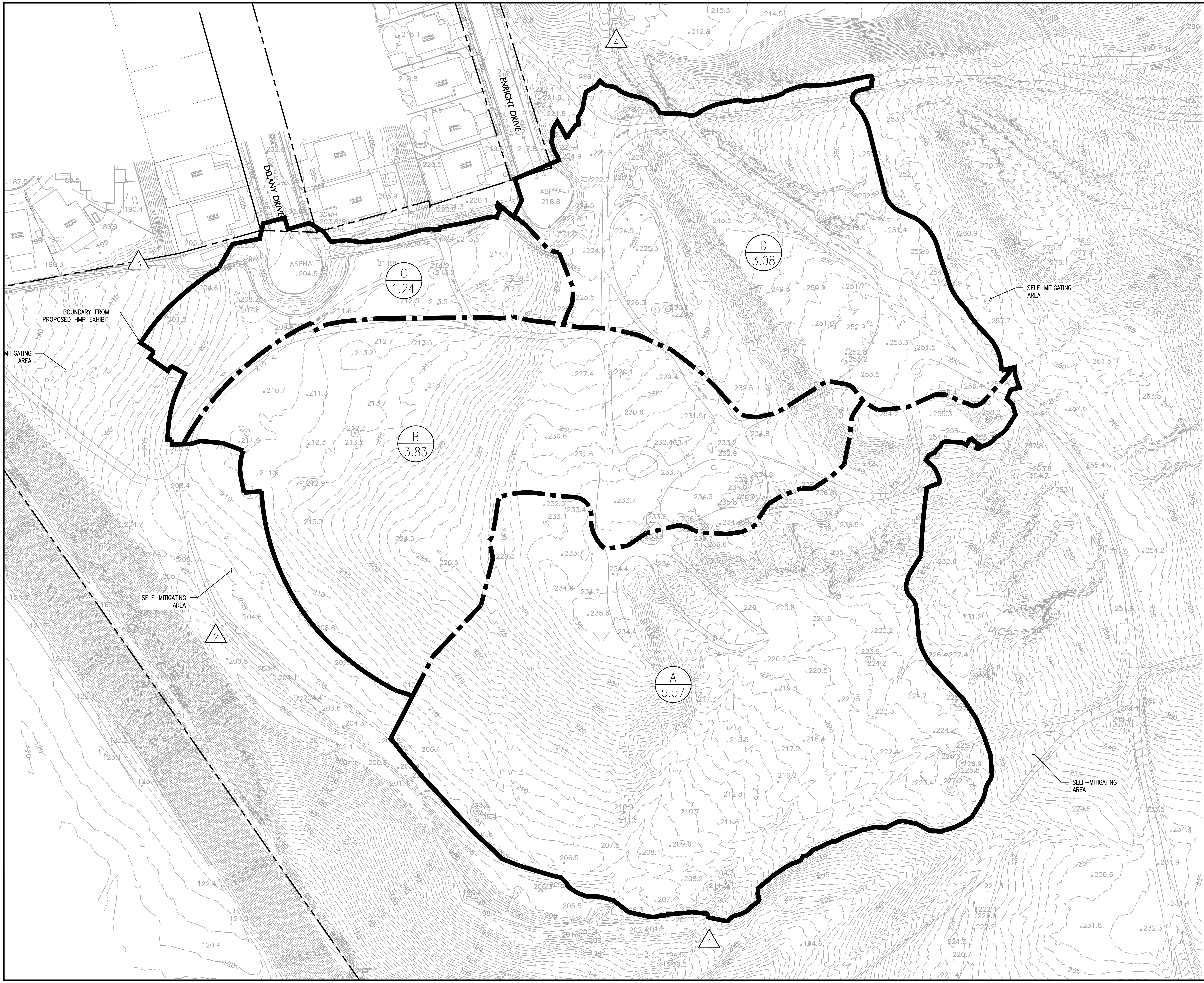
Project Name: Beyer Park

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

The Hydromodification Management Exhibit must identify:

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

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING



LEGEND

AC PAVEMENT (SDG-113)	▭
CONC. SIDEWALK	▨
NEW STORM DRAIN	——SD——
SUB DRAIN	— SD — — —
DRAINAGE BASIN BOUNDARY	■ ■ ■ ■ ■ ■ ▬ ■ ▬ ▬▬▬
EXISTING CONTOUR	— — XXX — —
POINT OF COMPLIANCE	△ 1
DRAINAGE MARKER & AREA (AC)	#1 X.XX

50 25 0 50 100 150

SCALE: 1"=50'

BWE
WWW.BWESD.COM
619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE: 08/21/2018
DRAWN BY:
CHECKED BY:
BWE JOB NUMBER:
CLIENT JOB NUMBER:
MUNICIPALITY PROJECT NUMBER:

SHEET TITLE

EXISTING CONDITIONS
HMP EXHIBIT

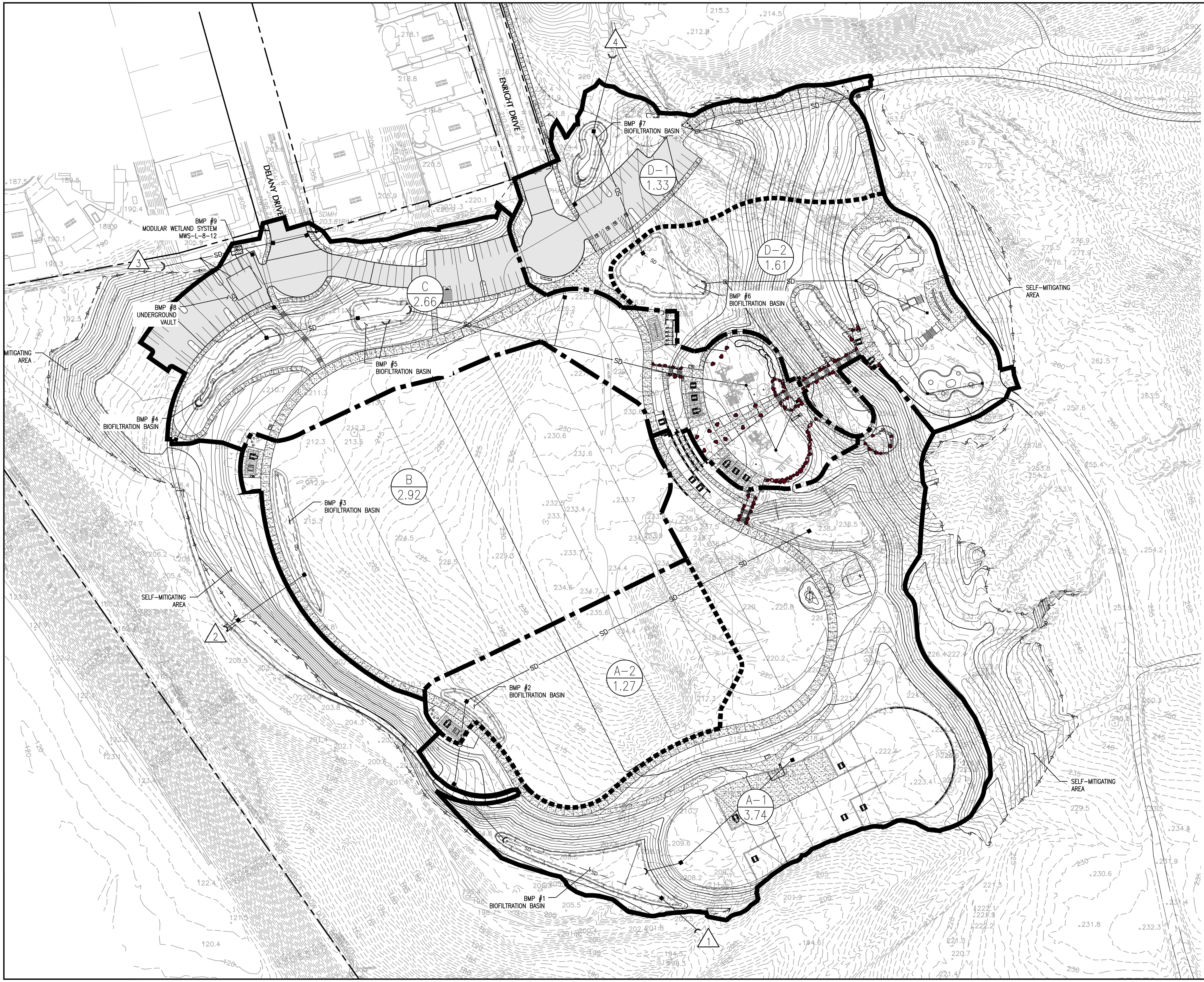
SHEET OF

PROJECT

BEYER PARK
SAN DIEGO, CA

SITE ADDRESS
BEYER BLVD AND ENRIGHT DR
SAN DIEGO, CA 92173

PLOT: \\BWE-FIVE\CAD\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\EXHIBITS\SWQMP\12820U.1.00 HMPS-EXST.DWG Malcolm D. Smith 8/21/2018 7:18 PM



LEGEND

- AC PAVEMENT (SDG-113)
- CONC. SIDEWALK
- NEW STORM DRAIN ——SD——
- SUB DRAIN — SD — —
- CONCRETE HEADWALL
- CATCH BASIN ■
- MODULAR WETLAND
- DRAINAGE BASIN BOUNDARY
- EXISTING CONTOUR —XXX—
- NEW CONTOUR —XXX— —XXX—
- POINT OF COMPLIANCE △1
- DRAINAGE MARKER & AREA (AC) #1 X.XX

50 25 0 50 100 150
SCALE: 1"=50'

BWE
WWW.BWESD.COM
619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE: 08/21/2018
DRAWN BY:
CHECKED BY:
BWE JOB NUMBER:
CLIENT JOB NUMBER:
MUNICIPALITY PROJECT NUMBER:

SHEET TITLE

PROPOSED CONDITIONS
HMP EXHIBIT

SHEET OF

PROJECT

BEYER PARK
SAN DIEGO, CA

SITE ADDRESS
BEYER BLVD AND ENRIGHT DR
SAN DIEGO, CA 92173

PLOT: \\BWE-FIVE\CAD\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\EXHIBITS\SWQMP\12820U.1.00 HMPS-PROP.DWG Malcolm D. Smith 8/21/2018 7:19 PM

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	POC 1
Site Name:	Beyer Park
Site Address:	
City:	San Diego
Report Date:	8/21/2018
Gage:	BONITA
Data Start:	1971/10/01 00:00
Data End:	2004/09/30 00:00
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/07/12

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Moderate	5.58
Pervious Total	5.58
Impervious Land Use	acre
Impervious Total	0
Basin Total	5.58

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin A-1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Moderate	3.3
Pervious Total	3.3
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.43
Impervious Total	0.43
Basin Total	3.73

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP #2	Surface BMP #2	

Basin A-2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	1.24
Pervious Total	1.24
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.03
Impervious Total	0.03
Basin Total	1.27

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP #2	Surface BMP #2	

Routing Elements
Predeveloped Routing

Mitigated Routing

BMP #1

Bottom Length:	66.00 ft.
Bottom Width:	65.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.75
Material type for second layer:	ESM
Material thickness of third layer:	2
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.67
Orifice Diameter (in.):	1.7
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	22.596
Total Outflow (ac-ft.):	25.623
Percent Through Underdrain:	88.19

Discharge Structure

Riser Height:	0.67 ft.
Riser Diameter:	18 in.

Element Flows To:

Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.0985	0.0000	0.0000	0.0000
0.0568	0.0985	0.0017	0.0000	0.0000
0.1136	0.0985	0.0034	0.0000	0.0000
0.1704	0.0985	0.0050	0.0000	0.0000
0.2273	0.0985	0.0067	0.0000	0.0000
0.2841	0.0985	0.0084	0.0000	0.0000
0.3409	0.0985	0.0101	0.0000	0.0000
0.3977	0.0985	0.0118	0.0000	0.0000
0.4545	0.0985	0.0134	0.0000	0.0000
0.5113	0.0985	0.0151	0.0000	0.0000
0.5681	0.0985	0.0168	0.0000	0.0000
0.6249	0.0985	0.0185	0.0000	0.0000
0.6818	0.0985	0.0201	0.0000	0.0000
0.7386	0.0985	0.0218	0.0000	0.0000
0.7954	0.0985	0.0235	0.0000	0.0000
0.8522	0.0985	0.0252	0.0000	0.0000
0.9090	0.0985	0.0269	0.0000	0.0000
0.9658	0.0985	0.0285	0.0000	0.0000
1.0226	0.0985	0.0302	0.0000	0.0000
1.0795	0.0985	0.0319	0.0044	0.0000
1.1363	0.0985	0.0336	0.0066	0.0000
1.1931	0.0985	0.0353	0.0113	0.0000
1.2499	0.0985	0.0369	0.0137	0.0000
1.3067	0.0985	0.0386	0.0173	0.0000
1.3635	0.0985	0.0403	0.0190	0.0000
1.4203	0.0985	0.0420	0.0219	0.0000
1.4771	0.0985	0.0436	0.0233	0.0000
1.5340	0.0985	0.0453	0.0257	0.0000
1.5908	0.0985	0.0470	0.0269	0.0000

1.6476	0.0985	0.0487	0.0290	0.0000
1.7044	0.0985	0.0504	0.0300	0.0000
1.7612	0.0985	0.0520	0.0319	0.0000
1.8180	0.0985	0.0537	0.0329	0.0000
1.8748	0.0985	0.0554	0.0346	0.0000
1.9316	0.0985	0.0571	0.0355	0.0000
1.9885	0.0985	0.0587	0.0371	0.0000
2.0453	0.0985	0.0611	0.0379	0.0000
2.1021	0.0985	0.0634	0.0394	0.0000
2.1589	0.0985	0.0657	0.0402	0.0000
2.2157	0.0985	0.0680	0.0416	0.0000
2.2725	0.0985	0.0704	0.0404	0.0000
2.3293	0.0985	0.0727	0.0406	0.0000
2.3862	0.0985	0.0750	0.0410	0.0000
2.4430	0.0985	0.0773	0.0420	0.0000
2.4998	0.0985	0.0796	0.0427	0.0000
2.5566	0.0985	0.0820	0.0439	0.0000
2.6134	0.0985	0.0843	0.0447	0.0000
2.6702	0.0985	0.0866	0.0464	0.0000
2.7270	0.0985	0.0889	0.0490	0.0000
2.7838	0.0985	0.0913	0.0519	0.0000
2.8407	0.0985	0.0936	0.0550	0.0000
2.8975	0.0985	0.0959	0.0580	0.0000
2.9543	0.0985	0.0982	0.0609	0.0000
3.0111	0.0985	0.1005	0.0637	0.0000
3.0679	0.0985	0.1029	0.0664	0.0000
3.1247	0.0985	0.1052	0.0690	0.0000
3.1815	0.0985	0.1075	0.0715	0.0000
3.2384	0.0985	0.1098	0.0740	0.0000
3.2952	0.0985	0.1122	0.0763	0.0000
3.3520	0.0985	0.1145	0.0786	0.0000
3.4088	0.0985	0.1168	0.0808	0.0000
3.4656	0.0985	0.1191	0.0830	0.0000
3.5224	0.0985	0.1214	0.0851	0.0000
3.5792	0.0985	0.1238	0.0871	0.0000
3.6360	0.0985	0.1261	0.0891	0.0000
3.6929	0.0985	0.1284	0.0911	0.0000
3.7497	0.0985	0.1307	0.0930	0.0000
3.8065	0.0985	0.1331	0.0949	0.0000
3.8633	0.0985	0.1354	0.0968	0.0000
3.9201	0.0985	0.1377	0.0986	0.0000
3.9769	0.0985	0.1400	0.1004	0.0000
4.0000	0.0985	0.1410	0.1519	0.0000

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
4.0000	0.0985	0.1410	0.0000	0.5106	0.0000
4.0568	0.0995	0.1466	0.0000	0.5106	0.0000
4.1136	0.1005	0.1523	0.0000	0.5247	0.0000
4.1704	0.1016	0.1580	0.0000	0.5388	0.0000
4.2273	0.1026	0.1638	0.0000	0.5529	0.0000
4.2841	0.1037	0.1697	0.0000	0.5671	0.0000
4.3409	0.1047	0.1756	0.0000	0.5812	0.0000
4.3977	0.1058	0.1816	0.0000	0.5953	0.0000
4.4545	0.1069	0.1876	0.0000	0.6094	0.0000
4.5113	0.1079	0.1937	0.0000	0.6235	0.0000
4.5681	0.1090	0.1999	0.0000	0.6376	0.0000
4.6249	0.1101	0.2061	0.0000	0.6517	0.0000

4.6818	0.1112	0.2124	0.0203	0.6658	0.0000
4.7386	0.1123	0.2187	0.2855	0.6799	0.0000
4.7954	0.1134	0.2251	0.7040	0.6940	0.0000
4.8522	0.1145	0.2316	1.2251	0.7081	0.0000
4.9090	0.1156	0.2382	1.8179	0.7222	0.0000
4.9658	0.1167	0.2447	2.4536	0.7363	0.0000
5.0226	0.1178	0.2514	3.1027	0.7504	0.0000
5.0795	0.1189	0.2581	3.7350	0.7645	0.0000
5.1363	0.1201	0.2649	4.3221	0.7786	0.0000
5.1700	0.1207	0.2690	4.8396	0.7870	0.0000

Surface BMP #1

Element Flows To:

Outlet 1	Outlet 2
	BMP #1

BMP #2

Bottom Length:		60.00 ft.
Bottom Width:		10.00 ft.
Material thickness of first layer:		0.25
Material type for first layer:		Mulch
Material thickness of second layer:		1.75
Material type for second layer:		ESM
Material thickness of third layer:		1.25
Material type for third layer:		GRAVEL
Underdrain used		
Underdrain Diameter (feet):		0.67
Orifice Diameter (in.):		1
Offset (in.):		3
Flow Through Underdrain (ac-ft.):		12.681
Total Outflow (ac-ft.):		27.056
Percent Through Underdrain:		46.87
Discharge Structure		
Riser Height:	0.5 ft.	
Riser Diameter:	18 in.	
Element Flows To:		
Outlet 1	Outlet 2	
Surface BMP #1		

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.0138	0.0000	0.0000	0.0000
0.0434	0.0138	0.0002	0.0000	0.0000
0.0868	0.0138	0.0004	0.0000	0.0000
0.1302	0.0138	0.0005	0.0000	0.0000
0.1736	0.0138	0.0007	0.0000	0.0000
0.2170	0.0138	0.0009	0.0000	0.0000
0.2604	0.0138	0.0011	0.0000	0.0000
0.3038	0.0138	0.0013	0.0000	0.0000
0.3473	0.0138	0.0014	0.0000	0.0000
0.3907	0.0138	0.0016	0.0000	0.0000
0.4341	0.0138	0.0018	0.0000	0.0000
0.4775	0.0138	0.0020	0.0000	0.0000
0.5209	0.0138	0.0022	0.0000	0.0000
0.5643	0.0138	0.0023	0.0000	0.0000
0.6077	0.0138	0.0025	0.0000	0.0000
0.6511	0.0138	0.0027	0.0000	0.0000
0.6945	0.0138	0.0029	0.0000	0.0000
0.7379	0.0138	0.0030	0.0000	0.0000
0.7813	0.0138	0.0032	0.0000	0.0000
0.8247	0.0138	0.0034	0.0000	0.0000
0.8681	0.0138	0.0036	0.0000	0.0000
0.9115	0.0138	0.0038	0.0000	0.0000
0.9549	0.0138	0.0039	0.0000	0.0000
0.9984	0.0138	0.0041	0.0000	0.0000
1.0418	0.0138	0.0043	0.0000	0.0000
1.0852	0.0138	0.0045	0.0011	0.0000
1.1286	0.0138	0.0047	0.0017	0.0000
1.1720	0.0138	0.0048	0.0032	0.0000
1.2154	0.0138	0.0050	0.0039	0.0000
1.2588	0.0138	0.0052	0.0050	0.0000
1.3022	0.0138	0.0054	0.0056	0.0000

1.3456	0.0138	0.0056	0.0065	0.0000
1.3890	0.0138	0.0057	0.0069	0.0000
1.4324	0.0138	0.0059	0.0076	0.0000
1.4758	0.0138	0.0061	0.0080	0.0000
1.5192	0.0138	0.0063	0.0087	0.0000
1.5626	0.0138	0.0065	0.0090	0.0000
1.6060	0.0138	0.0066	0.0096	0.0000
1.6495	0.0138	0.0068	0.0099	0.0000
1.6929	0.0138	0.0070	0.0104	0.0000
1.7363	0.0138	0.0072	0.0106	0.0000
1.7797	0.0138	0.0074	0.0111	0.0000
1.8231	0.0138	0.0075	0.0114	0.0000
1.8665	0.0138	0.0077	0.0118	0.0000
1.9099	0.0138	0.0079	0.0121	0.0000
1.9533	0.0138	0.0081	0.0125	0.0000
1.9967	0.0138	0.0083	0.0127	0.0000
2.0401	0.0138	0.0085	0.0131	0.0000
2.0835	0.0138	0.0087	0.0134	0.0000
2.1269	0.0138	0.0090	0.0138	0.0000
2.1703	0.0138	0.0092	0.0139	0.0000
2.2137	0.0138	0.0095	0.0143	0.0000
2.2571	0.0138	0.0097	0.0145	0.0000
2.3005	0.0138	0.0100	0.0149	0.0000
2.3440	0.0138	0.0102	0.0151	0.0000
2.3874	0.0138	0.0105	0.0154	0.0000
2.4308	0.0138	0.0107	0.0152	0.0000
2.4742	0.0138	0.0110	0.0152	0.0000
2.5176	0.0138	0.0112	0.0154	0.0000
2.5610	0.0138	0.0115	0.0156	0.0000
2.6044	0.0138	0.0117	0.0158	0.0000
2.6478	0.0138	0.0120	0.0160	0.0000
2.6912	0.0138	0.0122	0.0166	0.0000
2.7346	0.0138	0.0125	0.0173	0.0000
2.7780	0.0138	0.0127	0.0182	0.0000
2.8214	0.0138	0.0130	0.0190	0.0000
2.8648	0.0138	0.0132	0.0198	0.0000
2.9082	0.0138	0.0135	0.0206	0.0000
2.9516	0.0138	0.0137	0.0214	0.0000
2.9951	0.0138	0.0140	0.0221	0.0000
3.0385	0.0138	0.0142	0.0228	0.0000
3.0819	0.0138	0.0145	0.0235	0.0000
3.1253	0.0138	0.0147	0.0242	0.0000
3.1687	0.0138	0.0150	0.0249	0.0000
3.2121	0.0138	0.0152	0.0255	0.0000
3.2500	0.0138	0.0154	0.0470	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.2500	0.0138	0.0154	0.0000	0.0710	0.0000
3.2934	0.0142	0.0160	0.0000	0.0710	0.0000
3.3368	0.0146	0.0166	0.0000	0.0725	0.0000
3.3802	0.0150	0.0173	0.0000	0.0740	0.0000
3.4236	0.0155	0.0180	0.0000	0.0755	0.0000
3.4670	0.0159	0.0186	0.0000	0.0770	0.0000
3.5104	0.0163	0.0193	0.0000	0.0785	0.0000
3.5538	0.0168	0.0201	0.0000	0.0800	0.0000
3.5973	0.0172	0.0208	0.0000	0.0815	0.0000
3.6407	0.0177	0.0215	0.0000	0.0830	0.0000

3.6841	0.0181	0.0223	0.0000	0.0845	0.0000
3.7275	0.0186	0.0231	0.0000	0.0860	0.0000
3.7709	0.0190	0.0239	0.0480	0.0875	0.0000
3.8143	0.0195	0.0248	0.2592	0.0890	0.0000
3.8577	0.0199	0.0256	0.5610	0.0905	0.0000
3.9011	0.0204	0.0265	0.9291	0.0921	0.0000
3.9445	0.0209	0.0274	1.3484	0.0936	0.0000
3.9500	0.0209	0.0275	1.8059	0.0938	0.0000

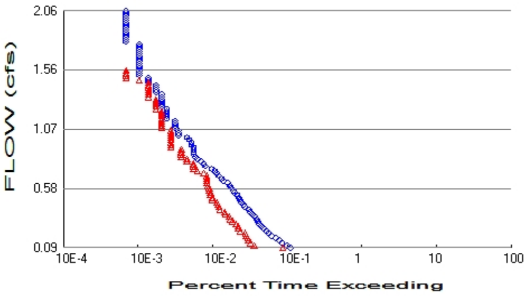
Surface BMP #2

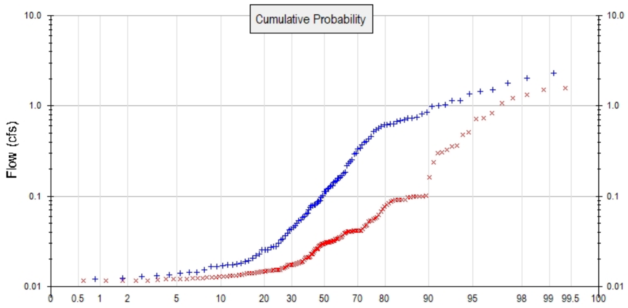
Element Flows To:

Outlet 1	Outlet 2
Surface BMP #1	BMP #2

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1	
Total Pervious Area:	5.58
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1	
Total Pervious Area:	4.54
Total Impervious Area:	0.46

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.700583
5 year	1.193123
10 year	1.648886
25 year	2.187484

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.161278
5 year	0.752349
10 year	1.281495
25 year	1.533589

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0896	321	253	78	Pass
0.1095	288	104	36	Pass
0.1293	247	94	38	Pass
0.1492	227	87	38	Pass
0.1690	202	85	42	Pass
0.1889	178	82	46	Pass
0.2087	163	80	49	Pass
0.2286	151	68	45	Pass
0.2484	139	63	45	Pass
0.2683	130	63	48	Pass
0.2882	122	59	48	Pass
0.3080	117	53	45	Pass
0.3279	112	50	44	Pass
0.3477	106	48	45	Pass
0.3676	98	43	43	Pass
0.3874	91	42	46	Pass
0.4073	88	36	40	Pass
0.4271	78	35	44	Pass
0.4470	74	34	45	Pass
0.4668	69	33	47	Pass
0.4867	67	29	43	Pass
0.5066	65	29	44	Pass
0.5264	62	27	43	Pass
0.5463	57	27	47	Pass
0.5661	55	26	47	Pass
0.5860	51	26	50	Pass
0.6058	49	25	51	Pass
0.6257	46	24	52	Pass
0.6455	40	24	60	Pass
0.6654	38	24	63	Pass
0.6852	35	24	68	Pass
0.7051	33	22	66	Pass
0.7250	31	18	58	Pass
0.7448	28	16	57	Pass
0.7647	23	16	69	Pass
0.7845	22	16	72	Pass
0.8044	20	13	65	Pass
0.8242	18	13	72	Pass
0.8441	17	11	64	Pass
0.8639	16	11	68	Pass
0.8838	16	11	68	Pass
0.9036	16	11	68	Pass
0.9235	16	8	50	Pass
0.9433	15	8	53	Pass
0.9632	15	8	53	Pass
0.9831	14	8	57	Pass
1.0029	13	8	61	Pass
1.0228	10	8	80	Pass
1.0426	10	8	80	Pass
1.0625	10	8	80	Pass
1.0823	9	6	66	Pass
1.1022	9	6	66	Pass
1.1220	9	6	66	Pass

1.1419	9	6	66	Pass
1.1617	7	6	85	Pass
1.1816	7	6	85	Pass
1.2015	7	6	85	Pass
1.2213	7	6	85	Pass
1.2412	7	5	71	Pass
1.2610	6	5	83	Pass
1.2809	6	5	83	Pass
1.3007	6	5	83	Pass
1.3206	6	5	83	Pass
1.3404	6	4	66	Pass
1.3603	6	4	66	Pass
1.3801	5	4	80	Pass
1.4000	5	4	80	Pass
1.4199	5	4	80	Pass
1.4397	5	4	80	Pass
1.4596	4	4	100	Pass
1.4794	4	3	75	Pass
1.4993	4	2	50	Pass
1.5191	3	2	66	Pass
1.5390	3	2	66	Pass
1.5588	3	2	66	Pass
1.5787	3	0	0	Pass
1.5985	3	0	0	Pass
1.6184	3	0	0	Pass
1.6383	3	0	0	Pass
1.6581	3	0	0	Pass
1.6780	3	0	0	Pass
1.6978	3	0	0	Pass
1.7177	3	0	0	Pass
1.7375	3	0	0	Pass
1.7574	3	0	0	Pass
1.7772	3	0	0	Pass
1.7971	2	0	0	Pass
1.8169	2	0	0	Pass
1.8368	2	0	0	Pass
1.8567	2	0	0	Pass
1.8765	2	0	0	Pass
1.8964	2	0	0	Pass
1.9162	2	0	0	Pass
1.9361	2	0	0	Pass
1.9559	2	0	0	Pass
1.9758	2	0	0	Pass
1.9956	2	0	0	Pass
2.0155	2	0	0	Pass
2.0353	2	0	0	Pass
2.0552	2	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

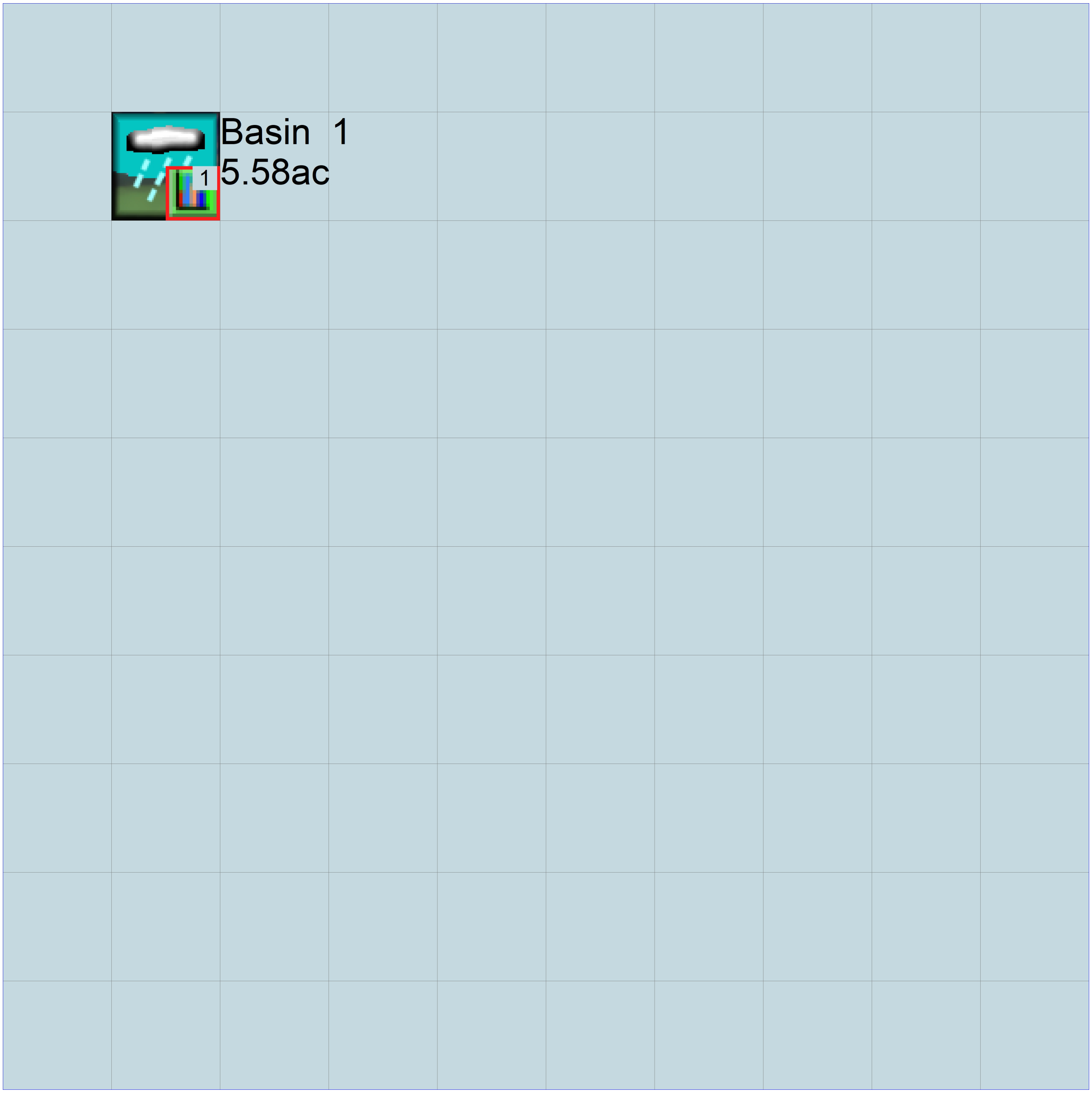
No PERLND changes have been made.

IMPLND Changes

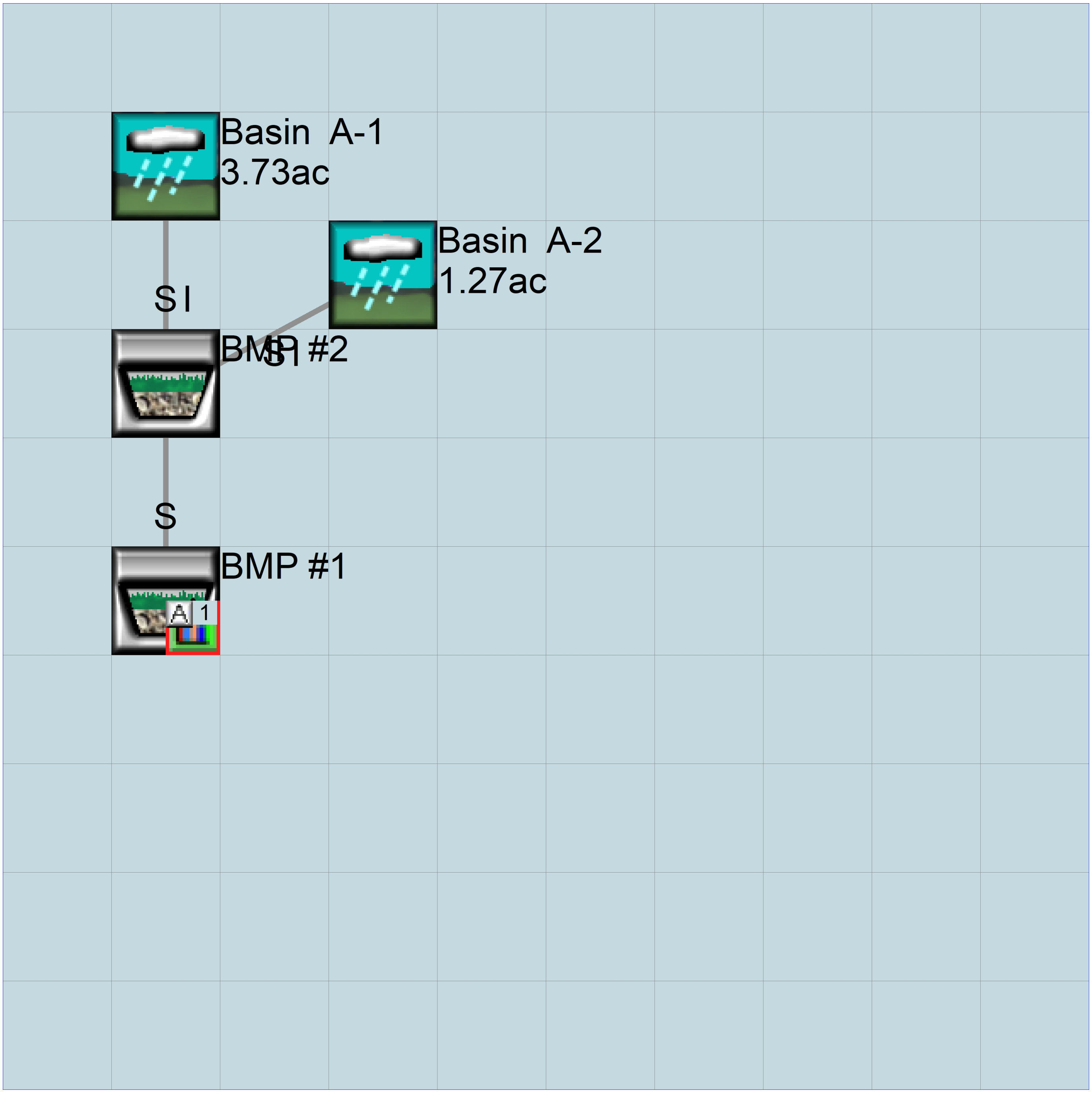
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------->***
<-ID->                                                              ***
WDM        26   POC 1.wdm
MESSU      25   PrePOC 1.MES
           27   PrePOC 1.L61
           28   PrePOC 1.L62
           30   POCPOC 11.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      29
      COPY       501
      DISPLY       1
    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
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                        User  t-series Engl Metr ***
                                        in  out           ***
   29      D,NatVeg,Moderate      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 ***
   29         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  *********
   29         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 ***
   29         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
   29             0         3     0.025        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   29             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 ***
   29             0       0.6      0.04         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  ***
   29       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  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  ***
   29       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  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
   29             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  29                        5.58     COPY   501     12
PERLND  29                        5.58     COPY   501     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



<-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
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       1971 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   POC 1.wdm
MESSU      25   MitPOC 1.MES
           27   MitPOC 1.L61
           28   MitPOC 1.L62
           30   POCPOC 11.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      47
      IMPLND       1
      PERLND      46
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface BMP #1              MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
    4        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   47      D,Urban,Moderate       1    1    1    1   27    0
   46      D,Urban,Flat           1    1    1    1   27    0
  END GEN-INFO
```

```
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   47         0    0    1    0    0    0    0    0    0    0    0    0
   46         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   47         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   46         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   47         0    1    1    1    0    0    0    0    1    1    0
   46         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   47              0       3.5     0.025        50       0.1       2.5     0.915
   46              0       3.8      0.03        50      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   47              0         0         2         2         0      0.05      0.05
   46              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   47              0       0.6      0.03         1       0.3         0
   46              0       0.6      0.03         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   47       0.6  0.6  0.6  0.6  0.7  0.7  0.7  0.7  0.7  0.6  0.6  0.6
   46       0.6  0.6  0.6  0.6  0.7  0.7  0.7  0.7  0.7  0.6  0.6  0.6
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   47       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
   46       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   47              0         0      0.15         0         1      0.05         0
   46              0         0      0.15         0         1      0.05         0
  END PWAT-STATE1

END PERLND

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

```
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  A-1***
PERLND  47                         3.3     RCHRES   1      2
PERLND  47                         3.3     RCHRES   1      3
IMPLND   1                        0.43     RCHRES   1      5
Basin  A-2***
PERLND  46                        1.24     RCHRES   1      2
PERLND  46                        1.24     RCHRES   1      3
IMPLND   1                        0.03     RCHRES   1      5

******Routing******
RCHRES   3                           1     RCHRES   4      8
RCHRES   2                           1     RCHRES   3      6
RCHRES   2                                 COPY     1     16
RCHRES   1                           1     RCHRES   3      7
RCHRES   1                                 COPY     1     17
RCHRES   1                           1     RCHRES   2      8
RCHRES   4                           1     COPY   501     16
RCHRES   3                           1     COPY   501     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
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
```

```
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     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 BMP #2          3    1    1    1   28    0    1
    2     BMP #2                  1    1    1    1   28    0    1
    3     Surface BMP #1          3    1    1    1   28    0    1
    4     BMP #1                  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
  END ACTIVITY

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
    3              3      0.01       0.0       0.0       0.5       0.0
    4              4      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0        4.0  5.0  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
  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 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
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  629.
*** 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            =  5794.
*** 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
END SPEC-ACTIONS
FTABLES
  FTABLE      4
   72    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.098485  0.000000  0.000000
  0.056813  0.098485  0.001679  0.000000
  0.113626  0.098485  0.003357  0.000000
  0.170440  0.098485  0.005036  0.000000
  0.227253  0.098485  0.006714  0.000000
  0.284066  0.098485  0.008393  0.000000
```

```
  0.340879  0.098485  0.010071  0.000000
  0.397692  0.098485  0.011750  0.000000
  0.454505  0.098485  0.013429  0.000000
  0.511319  0.098485  0.015107  0.000000
  0.568132  0.098485  0.016786  0.000000
  0.624945  0.098485  0.018464  0.000000
  0.681758  0.098485  0.020143  0.000000
  0.738571  0.098485  0.021821  0.000000
  0.795385  0.098485  0.023500  0.000000
  0.852198  0.098485  0.025179  0.000000
  0.909011  0.098485  0.026857  0.000000
  0.965824  0.098485  0.028536  0.000000
  1.022637  0.098485  0.030214  0.000000
  1.079451  0.098485  0.031893  0.004427
  1.136264  0.098485  0.033571  0.006641
  1.193077  0.098485  0.035250  0.011329
  1.249890  0.098485  0.036929  0.013672
  1.306703  0.098485  0.038607  0.017257
  1.363516  0.098485  0.040286  0.019049
  1.420330  0.098485  0.041964  0.021894
  1.477143  0.098485  0.043643  0.023316
  1.533956  0.098485  0.045321  0.025707
  1.590769  0.098485  0.047000  0.026902
  1.647582  0.098485  0.048679  0.028997
  1.704396  0.098485  0.050357  0.030045
  1.761209  0.098485  0.052036  0.031933
  1.818022  0.098485  0.053714  0.032877
  1.874835  0.098485  0.055393  0.034611
  1.931648  0.098485  0.057071  0.035478
  1.988462  0.098485  0.058750  0.037090
  2.045275  0.098485  0.061072  0.037896
  2.102088  0.098485  0.063394  0.039410
  2.158901  0.098485  0.065716  0.040166
  2.215714  0.098485  0.068038  0.041597
  2.272527  0.098485  0.070360  0.040376
  2.329341  0.098485  0.072682  0.040650
  2.386154  0.098485  0.075004  0.041000
  2.442967  0.098485  0.077326  0.042015
  2.499780  0.098485  0.079648  0.042725
  2.556593  0.098485  0.081970  0.043880
  2.613407  0.098485  0.084292  0.044652
  2.670220  0.098485  0.086614  0.046355
  2.727033  0.098485  0.088936  0.048978
  2.783846  0.098485  0.091258  0.051946
  2.840659  0.098485  0.093580  0.054991
  2.897473  0.098485  0.095902  0.057994
  2.954286  0.098485  0.098224  0.060908
  3.011099  0.098485  0.100546  0.063717
  3.067912  0.098485  0.102868  0.066421
  3.124725  0.098485  0.105190  0.069024
  3.181538  0.098485  0.107513  0.071536
  3.238352  0.098485  0.109835  0.073963
  3.295165  0.098485  0.112157  0.076313
  3.351978  0.098485  0.114479  0.078593
  3.408791  0.098485  0.116801  0.080808
  3.465604  0.098485  0.119123  0.082965
  3.522418  0.098485  0.121445  0.085068
  3.579231  0.098485  0.123767  0.087120
  3.636044  0.098485  0.126089  0.089127
  3.692857  0.098485  0.128411  0.091091
  3.749670  0.098485  0.130733  0.093016
  3.806484  0.098485  0.133055  0.094905
  3.863297  0.098485  0.135377  0.096764
  3.920110  0.098485  0.137699  0.098598
  3.976923  0.098485  0.140021  0.100431
  4.000000  0.098485  0.281928  0.151870
  END FTABLE  4
  FTABLE      3
   22    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
```

```
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.098485  0.000000  0.000000  0.000000  0.000000
  0.056813  0.099513  0.005624  0.000000  0.510633  0.000000
  0.113626  0.100546  0.011307  0.000000  0.524738  0.000000
  0.170440  0.101584  0.017049  0.000000  0.538842  0.000000
  0.227253  0.102628  0.022850  0.000000  0.552947  0.000000
  0.284066  0.103677  0.028711  0.000000  0.567052  0.000000
  0.340879  0.104732  0.034631  0.000000  0.581156  0.000000
  0.397692  0.105792  0.040611  0.000000  0.595261  0.000000
  0.454505  0.106857  0.046652  0.000000  0.609366  0.000000
  0.511319  0.107927  0.052753  0.000000  0.623470  0.000000
  0.568132  0.109003  0.058915  0.000000  0.637575  0.000000
  0.624945  0.110084  0.065139  0.000000  0.651680  0.000000
  0.681758  0.111171  0.071424  0.020305  0.665784  0.000000
  0.738571  0.112263  0.077771  0.285492  0.679889  0.000000
  0.795385  0.113360  0.084180  0.703962  0.693994  0.000000
  0.852198  0.114462  0.090652  1.225066  0.708098  0.000000
  0.909011  0.115570  0.097186  1.817904  0.722203  0.000000
  0.965824  0.116683  0.103784  2.453644  0.736308  0.000000
  1.022637  0.117802  0.110444  3.102664  0.750412  0.000000
  1.079451  0.118926  0.117169  3.734982  0.764517  0.000000
  1.136264  0.120055  0.123958  4.322086  0.778622  0.000000
  1.170000  0.120728  0.128019  4.839637  0.786997  0.000000
  END FTABLE  3
  FTABLE      2
   76    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.013774  0.000000  0.000000
  0.043407  0.013774  0.000179  0.000000
  0.086813  0.013774  0.000359  0.000000
  0.130220  0.013774  0.000538  0.000000
  0.173626  0.013774  0.000717  0.000000
  0.217033  0.013774  0.000897  0.000000
  0.260440  0.013774  0.001076  0.000000
  0.303846  0.013774  0.001256  0.000000
  0.347253  0.013774  0.001435  0.000000
  0.390659  0.013774  0.001614  0.000000
  0.434066  0.013774  0.001794  0.000000
  0.477473  0.013774  0.001973  0.000000
  0.520879  0.013774  0.002152  0.000000
  0.564286  0.013774  0.002332  0.000000
  0.607692  0.013774  0.002511  0.000000
  0.651099  0.013774  0.002690  0.000000
  0.694505  0.013774  0.002870  0.000000
  0.737912  0.013774  0.003049  0.000000
  0.781319  0.013774  0.003229  0.000000
  0.824725  0.013774  0.003408  0.000000
  0.868132  0.013774  0.003587  0.000000
  0.911538  0.013774  0.003767  0.000000
  0.954945  0.013774  0.003946  0.000000
  0.998352  0.013774  0.004125  0.000000
  1.041758  0.013774  0.004305  0.000000
  1.085165  0.013774  0.004484  0.001132
  1.128571  0.013774  0.004664  0.001698
  1.171978  0.013774  0.004843  0.003164
  1.215385  0.013774  0.005022  0.003898
  1.258791  0.013774  0.005202  0.005021
  1.302198  0.013774  0.005381  0.005582
  1.345604  0.013774  0.005560  0.006466
  1.389011  0.013774  0.005740  0.006908
  1.432418  0.013774  0.005919  0.007647
  1.475824  0.013774  0.006098  0.008016
  1.519231  0.013774  0.006278  0.008660
  1.562637  0.013774  0.006457  0.008982
  1.606044  0.013774  0.006637  0.009561
  1.649451  0.013774  0.006816  0.009850
  1.692857  0.013774  0.006995  0.010381
```

```
  1.736264  0.013774  0.007175  0.010646
  1.779670  0.013774  0.007354  0.011139
  1.823077  0.013774  0.007533  0.011385
  1.866484  0.013774  0.007713  0.011847
  1.909890  0.013774  0.007892  0.012078
  1.953297  0.013774  0.008071  0.012515
  1.996703  0.013774  0.008251  0.012733
  2.040110  0.013774  0.008499  0.013148
  2.083516  0.013774  0.008747  0.013355
  2.126923  0.013774  0.008995  0.013752
  2.170330  0.013774  0.009243  0.013950
  2.213736  0.013774  0.009491  0.014330
  2.257143  0.013774  0.009740  0.014520
  2.300549  0.013774  0.009988  0.014885
  2.343956  0.013774  0.010236  0.015068
  2.387363  0.013774  0.010484  0.015420
  2.430769  0.013774  0.010732  0.015196
  2.474176  0.013774  0.010980  0.015223
  2.517582  0.013774  0.011228  0.015364
  2.560989  0.013774  0.011476  0.015568
  2.604396  0.013774  0.011725  0.015793
  2.647802  0.013774  0.011973  0.016036
  2.691209  0.013774  0.012221  0.016604
  2.734615  0.013774  0.012469  0.017348
  2.778022  0.013774  0.012717  0.018157
  2.821429  0.013774  0.012965  0.018980
  2.864835  0.013774  0.013213  0.019792
  2.908242  0.013774  0.013461  0.020585
  2.951648  0.013774  0.013710  0.021355
  2.995055  0.013774  0.013958  0.022101
  3.038462  0.013774  0.014206  0.022825
  3.081868  0.013774  0.014454  0.023529
  3.125275  0.013774  0.014702  0.024215
  3.168681  0.013774  0.014950  0.024886
  3.212088  0.013774  0.015198  0.025547
  3.250000  0.013774  0.046245  0.047002
  END FTABLE  2
  FTABLE      1
   18    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.013774  0.000000  0.000000  0.000000  0.000000
  0.043407  0.014194  0.000607  0.000000  0.070952  0.000000
  0.086813  0.014617  0.001232  0.000000  0.072459  0.000000
  0.130220  0.015044  0.001876  0.000000  0.073966  0.000000
  0.173626  0.015473  0.002538  0.000000  0.075473  0.000000
  0.217033  0.015906  0.003219  0.000000  0.076980  0.000000
  0.260440  0.016341  0.003919  0.000000  0.078488  0.000000
  0.303846  0.016780  0.004638  0.000000  0.079995  0.000000
  0.347253  0.017222  0.005376  0.000000  0.081502  0.000000
  0.390659  0.017667  0.006133  0.000000  0.083009  0.000000
  0.434066  0.018115  0.006910  0.000000  0.084516  0.000000
  0.477473  0.018566  0.007706  0.000000  0.086023  0.000000
  0.520879  0.019021  0.008522  0.048031  0.087531  0.000000
  0.564286  0.019478  0.009357  0.259183  0.089038  0.000000
  0.607692  0.019939  0.010213  0.560996  0.090545  0.000000
  0.651099  0.020402  0.011088  0.929082  0.092052  0.000000
  0.694505  0.020869  0.011984  1.348396  0.093559  0.000000
  0.700000  0.020928  0.012099  1.805937  0.093750  0.000000
  END FTABLE  1
END FTABLES

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

```
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM     22 IRRG     ENGL    0.7       SAME PERLND  47     EXTNL  SURLI
WDM     22 IRRG     ENGL    0.7       SAME PERLND  46     EXTNL  SURLI
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   3     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

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   4 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1002 STAG     ENGL      REPL
RCHRES   3 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
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        6
RCHRES     ROFLOW                          RCHRES         INFLOW
  END MASS-LINK    6

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

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

  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:   341   6

DATE/TIME: 1983/ 3/ 1 17: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     573.10
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1983/ 3/ 1 17: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -1.856E+04   10.067     10.067        3
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1983/ 3/ 2 16: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18  522.02     527.03     529.73
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1983/ 3/ 2 16: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -2.800E+03    1.5366  1.5366E+00      3
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1983/ 3/24  5: 0

RCHRES:     1
```

```
The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     546.37
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1983/ 3/24  5: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -8.847E+03    4.8333  4.8333E+00      3
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1985/11/25 19: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     556.04
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1985/11/25 19: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -1.236E+04    6.7365  6.7365E+00      3
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1991/ 2/28 21: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     527.82
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1991/ 2/28 21: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -2.107E+03    1.1577  1.1571E+00      2
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1991/ 2/28 23: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     527.40
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1991/ 2/28 23: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -1.954E+03    1.0734  1.0729E+00      2
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1991/ 3/ 1  7: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     531.85
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1991/ 3/ 1  7: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
```

```
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -3.570E+03    1.9584  1.9584E+00      3
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1991/ 3/27  3: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     528.21
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1991/ 3/27  3: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -2.250E+03    1.2359  1.2352E+00      2
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1992/ 3/ 2 19: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
18 5.2202E+02  527.03     528.45
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1992/ 3/ 2 19: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
2.5700E+00 1818.1     -2.337E+03    1.2841  1.2833E+00      2
```

Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	POC 2
Site Name:	Beyer Park
Site Address:	
City:	San Diego
Report Date:	8/21/2018
Gage:	BONITA
Data Start:	1971/10/01 00:00
Data End:	2004/09/30 00:00
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/07/12

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Moderate	3.83
Pervious Total	3.83
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.83

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	2.81
Pervious Total	2.81
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.1
Impervious Total	0.1
Basin Total	2.91

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP 3	Surface BMP 3	

Routing Elements

Predeveloped Routing

Mitigated Routing

BMP 3

Bottom Length: 41.00 ft.
Bottom Width: 40.00 ft.
Material thickness of first layer: 0.25
Material type for first layer: Mulch
Material thickness of second layer: 1.75
Material type for second layer: ESM
Material thickness of third layer: 1.25
Material type for third layer: GRAVEL
Underdrain used
Underdrain Diameter (feet): 0.67
Orifice Diameter (in.): 1
Offset (in.): 3
Flow Through Underdrain (ac-ft.): 8.245
Total Outflow (ac-ft.): 11.885
Percent Through Underdrain: 69.37
Discharge Structure
Riser Height: 0.5 ft.
Riser Diameter: 18 in.
Element Flows To:
Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.0376	0.0000	0.0000	0.0000
0.0467	0.0376	0.0005	0.0000	0.0000
0.0934	0.0376	0.0011	0.0000	0.0000
0.1401	0.0376	0.0016	0.0000	0.0000
0.1868	0.0376	0.0021	0.0000	0.0000
0.2335	0.0376	0.0026	0.0000	0.0000
0.2802	0.0376	0.0032	0.0000	0.0000
0.3269	0.0376	0.0037	0.0000	0.0000
0.3736	0.0376	0.0042	0.0000	0.0000
0.4203	0.0376	0.0047	0.0000	0.0000
0.4670	0.0376	0.0053	0.0000	0.0000
0.5137	0.0376	0.0058	0.0000	0.0000
0.5604	0.0376	0.0063	0.0000	0.0000
0.6071	0.0376	0.0069	0.0000	0.0000
0.6538	0.0376	0.0074	0.0000	0.0000
0.7005	0.0376	0.0079	0.0000	0.0000
0.7473	0.0376	0.0084	0.0000	0.0000
0.7940	0.0376	0.0090	0.0000	0.0000
0.8407	0.0376	0.0095	0.0000	0.0000
0.8874	0.0376	0.0100	0.0000	0.0000
0.9341	0.0376	0.0106	0.0000	0.0000
0.9808	0.0376	0.0111	0.0000	0.0000
1.0275	0.0376	0.0116	0.0000	0.0000
1.0742	0.0376	0.0121	0.0000	0.0000
1.1209	0.0376	0.0127	0.0000	0.0000
1.1676	0.0376	0.0132	0.0000	0.0000
1.2143	0.0376	0.0137	0.0000	0.0000
1.2610	0.0376	0.0142	0.0000	0.0000
1.3077	0.0376	0.0148	0.0000	0.0000

1.3544	0.0376	0.0153	0.0000	0.0000
1.4011	0.0376	0.0158	0.0000	0.0000
1.4478	0.0376	0.0164	0.0000	0.0000
1.4945	0.0376	0.0169	0.0000	0.0000
1.5412	0.0376	0.0174	0.0000	0.0000
1.5879	0.0376	0.0179	0.0000	0.0000
1.6346	0.0376	0.0185	0.0000	0.0000
1.6813	0.0376	0.0190	0.0000	0.0000
1.7280	0.0376	0.0195	0.0000	0.0000
1.7747	0.0376	0.0200	0.0000	0.0000
1.8214	0.0376	0.0206	0.0000	0.0000
1.8681	0.0376	0.0211	0.0000	0.0000
1.9148	0.0376	0.0216	0.0000	0.0000
1.9615	0.0376	0.0222	0.0000	0.0000
2.0082	0.0376	0.0229	0.0000	0.0000
2.0549	0.0376	0.0236	0.0000	0.0000
2.1016	0.0376	0.0243	0.0000	0.0000
2.1484	0.0376	0.0251	0.0000	0.0000
2.1951	0.0376	0.0258	0.0000	0.0000
2.2418	0.0376	0.0265	0.0000	0.0000
2.2885	0.0376	0.0273	0.0000	0.0000
2.3352	0.0376	0.0280	0.0000	0.0000
2.3819	0.0376	0.0287	0.0000	0.0000
2.4286	0.0376	0.0295	0.0000	0.0000
2.4753	0.0376	0.0302	0.0000	0.0000
2.5220	0.0376	0.0309	0.0000	0.0000
2.5687	0.0376	0.0316	0.0000	0.0000
2.6154	0.0376	0.0324	0.0000	0.0000
2.6621	0.0376	0.0331	0.0000	0.0000
2.7088	0.0376	0.0338	0.0000	0.0000
2.7555	0.0376	0.0346	0.0000	0.0000
2.8022	0.0376	0.0353	0.0000	0.0000
2.8489	0.0376	0.0360	0.0000	0.0000
2.8956	0.0376	0.0367	0.0000	0.0000
2.9423	0.0376	0.0375	0.0000	0.0000
2.9890	0.0376	0.0382	0.0000	0.0000
3.0357	0.0376	0.0389	0.0000	0.0000
3.0824	0.0376	0.0397	0.0000	0.0000
3.1291	0.0376	0.0404	0.0000	0.0000
3.1758	0.0376	0.0411	0.0000	0.0000
3.2225	0.0376	0.0419	0.0000	0.0000
3.2500	0.0376	0.0423	0.0000	0.0000

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
3.2500	0.0376	0.0423	0.0000	0.1942	0.0000
3.2967	0.0382	0.0441	0.0000	0.1942	0.0000
3.3434	0.0387	0.0459	0.0000	0.1987	0.0000
3.3901	0.0392	0.0477	0.0000	0.2031	0.0000
3.4368	0.0398	0.0495	0.0000	0.2075	0.0000
3.4835	0.0403	0.0514	0.0000	0.2120	0.0000
3.5302	0.0408	0.0533	0.0000	0.2164	0.0000
3.5769	0.0414	0.0552	0.0000	0.2208	0.0000
3.6236	0.0419	0.0571	0.0000	0.2253	0.0000
3.6703	0.0425	0.0591	0.0000	0.2297	0.0000
3.7170	0.0430	0.0611	0.0000	0.2341	0.0000
3.7637	0.0436	0.0631	0.0000	0.2386	0.0000
3.8104	0.0442	0.0652	0.0000	0.2430	0.0000

3.8571	0.0447	0.0673	0.0000	0.2474	0.0000
3.9038	0.0453	0.0694	0.0000	0.2519	0.0000
3.9505	0.0459	0.0715	0.0000	0.2563	0.0000
3.9973	0.0464	0.0737	0.0000	0.2607	0.0000
4.0440	0.0470	0.0758	0.0000	0.2652	0.0000
4.0907	0.0476	0.0780	0.0000	0.2696	0.0000
4.1374	0.0482	0.0803	0.0000	0.2740	0.0000
4.1841	0.0488	0.0825	0.0000	0.2785	0.0000
4.2308	0.0494	0.0848	0.0000	0.2829	0.0000
4.2500	0.0496	0.0858	0.0000	0.2847	0.0000

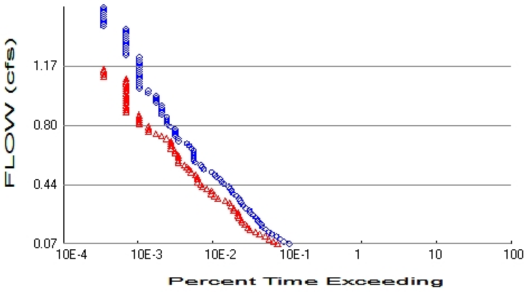
Surface BMP 3

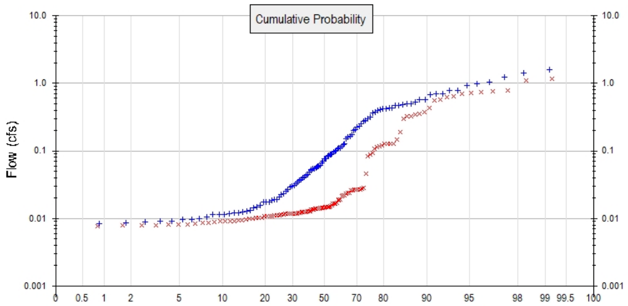
Element Flows To:

Outlet 1	Outlet 2
	BMP 3

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.83
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 2.81
Total Impervious Area: 0.1

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.480866
5 year	0.818936
10 year	1.131762
25 year	1.501445

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.321888
5 year	0.711817
10 year	0.779663
25 year	1.120865

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0697	306	215	70	Pass
0.0844	261	188	72	Pass
0.0992	232	164	70	Pass
0.1140	207	146	70	Pass
0.1288	180	124	68	Pass
0.1436	163	109	66	Pass
0.1583	148	91	61	Pass
0.1731	136	85	62	Pass
0.1879	129	79	61	Pass
0.2027	120	72	60	Pass
0.2175	115	70	60	Pass
0.2323	109	65	59	Pass
0.2470	102	64	62	Pass
0.2618	93	63	67	Pass
0.2766	90	56	62	Pass
0.2914	80	55	68	Pass
0.3062	74	51	68	Pass
0.3209	69	49	71	Pass
0.3357	67	43	64	Pass
0.3505	65	34	52	Pass
0.3653	61	31	50	Pass
0.3801	55	28	50	Pass
0.3948	52	28	53	Pass
0.4096	49	24	48	Pass
0.4244	48	21	43	Pass
0.4392	41	20	48	Pass
0.4540	38	18	47	Pass
0.4687	36	18	50	Pass
0.4835	33	18	54	Pass
0.4983	31	17	54	Pass
0.5131	28	15	53	Pass
0.5279	22	14	63	Pass
0.5426	21	13	61	Pass
0.5574	20	12	60	Pass
0.5722	17	10	58	Pass
0.5870	16	10	62	Pass
0.6018	16	10	62	Pass
0.6165	16	10	62	Pass
0.6313	16	9	56	Pass
0.6461	16	9	56	Pass
0.6609	15	8	53	Pass
0.6757	14	8	57	Pass
0.6904	13	8	61	Pass
0.7052	10	8	80	Pass
0.7200	10	7	70	Pass
0.7348	9	6	66	Pass
0.7496	9	5	55	Pass
0.7643	9	4	44	Pass
0.7791	9	4	44	Pass
0.7939	8	4	50	Pass
0.8087	7	3	42	Pass
0.8235	7	3	42	Pass
0.8382	7	3	42	Pass

0.8530	7	3	42	Pass
0.8678	6	3	50	Pass
0.8826	6	2	33	Pass
0.8974	6	2	33	Pass
0.9121	6	2	33	Pass
0.9269	6	2	33	Pass
0.9417	5	2	40	Pass
0.9565	5	2	40	Pass
0.9713	5	2	40	Pass
0.9860	5	2	40	Pass
1.0008	4	2	50	Pass
1.0156	4	2	50	Pass
1.0304	3	2	66	Pass
1.0452	3	2	66	Pass
1.0599	3	2	66	Pass
1.0747	3	2	66	Pass
1.0895	3	2	66	Pass
1.1043	3	1	33	Pass
1.1191	3	1	33	Pass
1.1338	3	1	33	Pass
1.1486	3	1	33	Pass
1.1634	3	0	0	Pass
1.1782	3	0	0	Pass
1.1930	3	0	0	Pass
1.2077	3	0	0	Pass
1.2225	3	0	0	Pass
1.2373	2	0	0	Pass
1.2521	2	0	0	Pass
1.2669	2	0	0	Pass
1.2816	2	0	0	Pass
1.2964	2	0	0	Pass
1.3112	2	0	0	Pass
1.3260	2	0	0	Pass
1.3408	2	0	0	Pass
1.3555	2	0	0	Pass
1.3703	2	0	0	Pass
1.3851	2	0	0	Pass
1.3999	2	0	0	Pass
1.4147	1	0	0	Pass
1.4294	1	0	0	Pass
1.4442	1	0	0	Pass
1.4590	1	0	0	Pass
1.4738	1	0	0	Pass
1.4886	1	0	0	Pass
1.5033	1	0	0	Pass
1.5181	1	0	0	Pass
1.5329	1	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

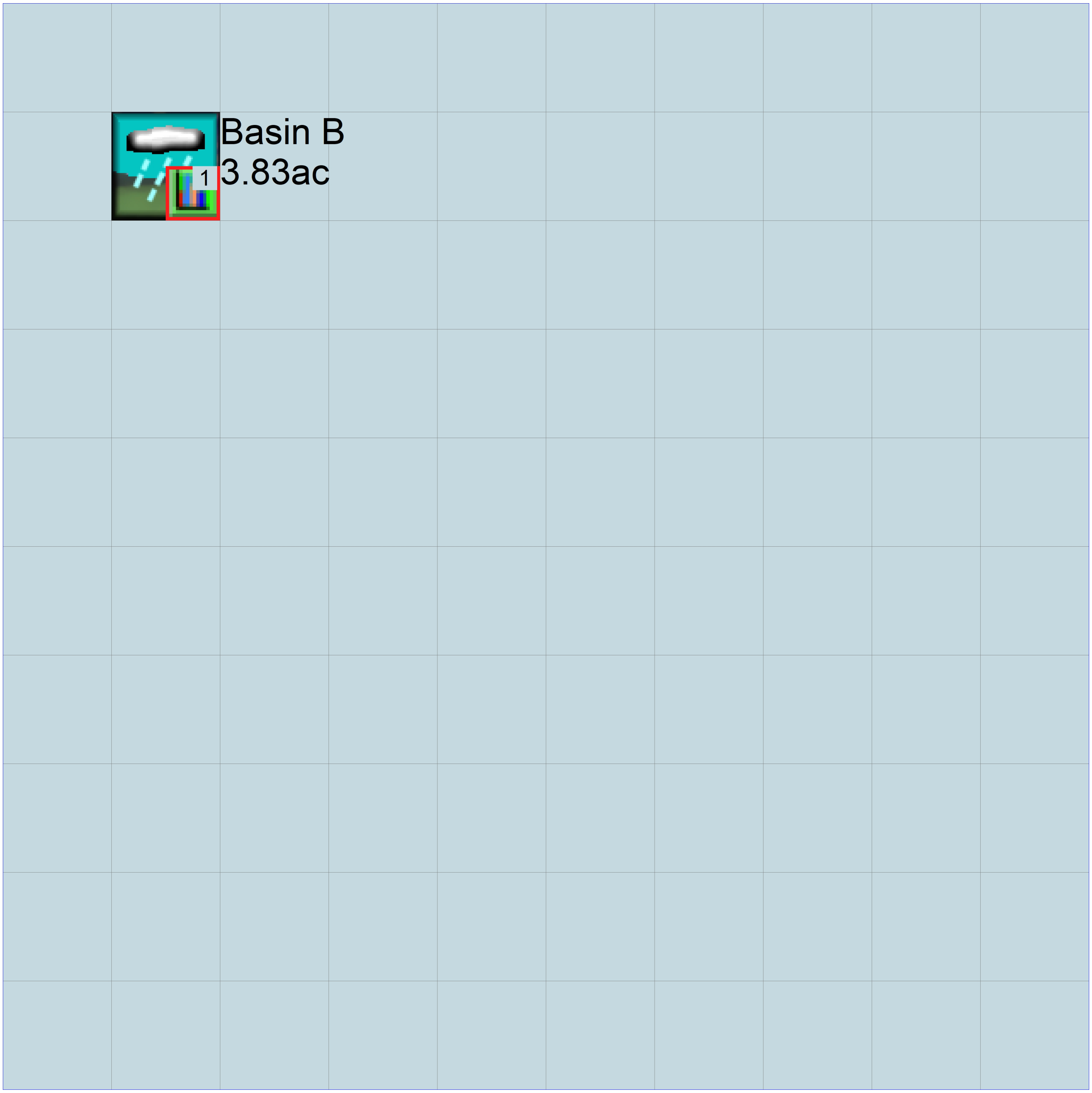
No PERLND changes have been made.

IMPLND Changes

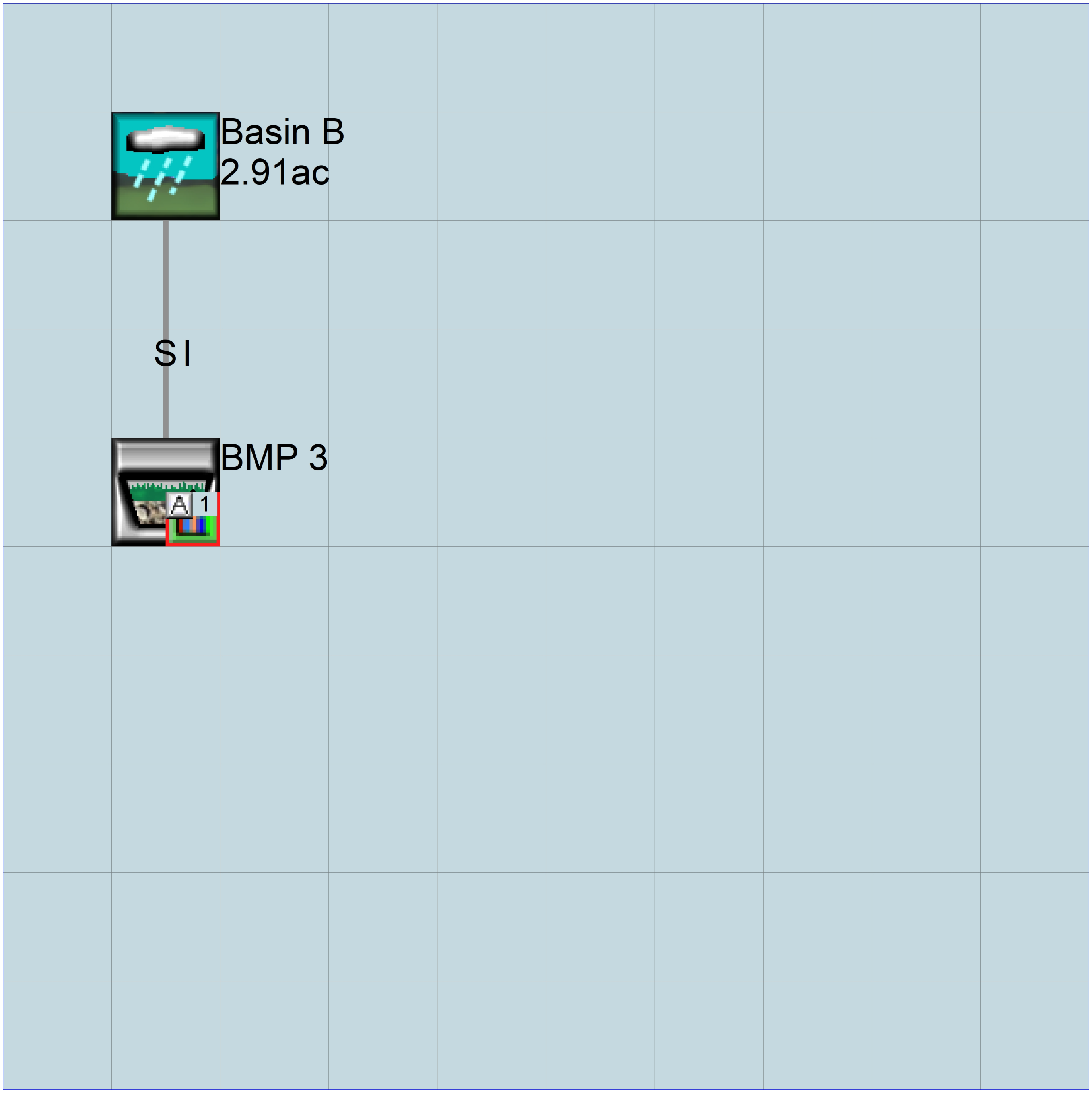
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   POC 2.wdm
MESSU      25   PrePOC 2.MES
           27   PrePOC 2.L61
           28   PrePOC 2.L62
           30   POCPOC 21.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      29
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin B                    MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1        1    1
  501        1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                            in  out           ***
   29      D,NatVeg,Moderate      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 ***
   29         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  *********
   29         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 ***
   29         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
   29               0         3     0.025        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   29               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 ***
   29               0       0.6      0.04         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  ***
   29       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  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  ***
   29       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  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
   29               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 B***
PERLND  29                        3.83     COPY   501     12
PERLND  29                        3.83     COPY   501     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



<-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
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       1971 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   POC 2.wdm
MESSU      25   MitPOC 2.MES
           27   MitPOC 2.L61
           28   MitPOC 2.L62
           30   POCPOC 21.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      46
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface BMP 3              MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                             in  out           ***
   46      D,Urban,Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

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

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

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

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

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

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   46              0         0      0.15         0         1      0.05         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin B***
PERLND  46                        2.81     RCHRES   1      2
PERLND  46                        2.81     RCHRES   1      3
IMPLND   1                         0.1     RCHRES   1      5

******Routing******
RCHRES   1                           1     RCHRES   2      8
PERLND  46                        2.81     COPY     1     12
IMPLND   1                         0.1     COPY     1     15
PERLND  46                        2.81     COPY     1     13
RCHRES   2                           1     COPY   501     16
RCHRES   1                           1     COPY   501     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
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     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 BMP 3           3    1    1    1   28    0    1
    2     BMP 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
```

```
  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
  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
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.5       0.0
    2             2      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  5.0  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
  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 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
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  1732.
*** 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
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   71    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
```

```
 0.000000  0.037649  0.000000  0.000000
 0.046703  0.037649  0.000528  0.000000
 0.093407  0.037649  0.001055  0.000000
 0.140110  0.037649  0.001583  0.000000
 0.186813  0.037649  0.002110  0.000000
 0.233516  0.037649  0.002638  0.000000
 0.280220  0.037649  0.003165  0.000000
 0.326923  0.037649  0.003693  0.000000
 0.373626  0.037649  0.004220  0.000000
 0.420330  0.037649  0.004748  0.000000
 0.467033  0.037649  0.005275  0.000000
 0.513736  0.037649  0.005803  0.000000
 0.560440  0.037649  0.006330  0.000000
 0.607143  0.037649  0.006858  0.000000
 0.653846  0.037649  0.007385  0.000000
 0.700549  0.037649  0.007913  0.000000
 0.747253  0.037649  0.008440  0.000000
 0.793956  0.037649  0.008968  0.000000
 0.840659  0.037649  0.009495  0.000000
 0.887363  0.037649  0.010023  0.000000
 0.934066  0.037649  0.010550  0.000000
 0.980769  0.037649  0.011078  0.000000
 1.027473  0.037649  0.011605  0.000000
 1.074176  0.037649  0.012133  0.001109
 1.120879  0.037649  0.012660  0.001664
 1.167582  0.037649  0.013188  0.003202
 1.214286  0.037649  0.013715  0.003972
 1.260989  0.037649  0.014243  0.005149
 1.307692  0.037649  0.014770  0.005737
 1.354396  0.037649  0.015298  0.006661
 1.401099  0.037649  0.015825  0.007123
 1.447802  0.037649  0.016353  0.007893
 1.494505  0.037649  0.016880  0.008278
 1.541209  0.037649  0.017408  0.008948
 1.587912  0.037649  0.017935  0.009284
 1.634615  0.037649  0.018463  0.009886
 1.681319  0.037649  0.018990  0.010187
 1.728022  0.037649  0.019518  0.010739
 1.774725  0.037649  0.020045  0.011015
 1.821429  0.037649  0.020573  0.011527
 1.868132  0.037649  0.021100  0.011783
 1.914835  0.037649  0.021628  0.012263
 1.961538  0.037649  0.022155  0.012503
 2.008242  0.037649  0.022885  0.012957
 2.054945  0.037649  0.023615  0.013184
 2.101648  0.037649  0.024344  0.013615
 2.148352  0.037649  0.025074  0.013831
 2.195055  0.037649  0.025804  0.014242
 2.241758  0.037649  0.026533  0.014448
 2.288462  0.037649  0.027263  0.014842
 2.335165  0.037649  0.027993  0.015040
 2.381868  0.037649  0.028723  0.015419
 2.428571  0.037649  0.029452  0.015609
 2.475275  0.037649  0.030182  0.015975
 2.521978  0.037649  0.030912  0.016158
 2.568681  0.037649  0.031641  0.016512
 2.615385  0.037649  0.032371  0.016505
 2.662088  0.037649  0.033101  0.016517
 2.708791  0.037649  0.033831  0.017034
 2.755495  0.037649  0.034560  0.017776
 2.802198  0.037649  0.035290  0.018606
 2.848901  0.037649  0.036020  0.019460
 2.895604  0.037649  0.036749  0.020308
 2.942308  0.037649  0.037479  0.021137
 2.989011  0.037649  0.038209  0.021942
 3.035714  0.037649  0.038938  0.022724
 3.082418  0.037649  0.039668  0.023483
 3.129121  0.037649  0.040398  0.024221
 3.175824  0.037649  0.041128  0.024942
 3.222527  0.037649  0.041857  0.025655
```

```
  3.250000  0.037649  0.084573  0.047002
  END FTABLE  2
  FTABLE      1
   23    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.037649  0.000000  0.000000  0.000000  0.000000
  0.046703  0.038172  0.001771  0.000000  0.194247  0.000000
  0.093407  0.038699  0.003566  0.000000  0.198680  0.000000
  0.140110  0.039229  0.005385  0.000000  0.203112  0.000000
  0.186813  0.039762  0.007230  0.000000  0.207545  0.000000
  0.233516  0.040300  0.009099  0.000000  0.211977  0.000000
  0.280220  0.040841  0.010994  0.000000  0.216410  0.000000
  0.326923  0.041385  0.012914  0.000000  0.220842  0.000000
  0.373626  0.041933  0.014860  0.000000  0.225275  0.000000
  0.420330  0.042485  0.016831  0.000000  0.229707  0.000000
  0.467033  0.043040  0.018828  0.000000  0.234140  0.000000
  0.513736  0.043599  0.020852  0.025637  0.238572  0.000000
  0.560440  0.044162  0.022901  0.236300  0.243005  0.000000
  0.607143  0.044728  0.024977  0.556725  0.247437  0.000000
  0.653846  0.045298  0.027079  0.954243  0.251870  0.000000
  0.700549  0.045871  0.029208  1.410104  0.256302  0.000000
  0.747253  0.046448  0.031364  1.908159  0.260735  0.000000
  0.793956  0.047028  0.033546  2.432364  0.265167  0.000000
  0.840659  0.047613  0.035756  2.966220  0.269600  0.000000
  0.887363  0.048200  0.037994  3.493013  0.274032  0.000000
  0.934066  0.048792  0.040259  3.996465  0.278465  0.000000
  0.980769  0.049387  0.042551  4.461667  0.282897  0.000000
  1.000000  0.049633  0.043504  4.876229  0.284722  0.000000
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM     22 IRRG     ENGL    0.7       SAME PERLND  46     EXTNL  SURLI
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     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
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

Mitigated HSPF Message File

Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	POC 3
Site Name:	Beyer Park
Site Address:	
City:	San Diego
Report Date:	8/21/2018
Gage:	BONITA
Data Start:	10/01/1971
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/07/12

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Moderate	1.24
Pervious Total	1.24
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.24

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin #6

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	0.33
Pervious Total	0.33
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.03
Impervious Total	0.03
Basin Total	0.36

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP #4	Surface BMP #4	

Basin #7

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	0.75
Pervious Total	0.75
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.54
Impervious Total	0.54
Basin Total	1.29

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP #5	Surface BMP #5	

Basin #8

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	0.365
Pervious Total	0.365
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.565
Impervious Total	0.565
Basin Total	0.93

Element Flows To:

Surface	Interflow	Groundwater
BMP #8	BMP #8	

Routing Elements

Predeveloped Routing

Mitigated Routing

BMP #4

Bottom Length:	40.00 ft.
Bottom Width:	40.00 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
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.67
Orifice Diameter (in.):	0.5
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	1.487
Total Outflow (ac-ft.):	1.508
Percent Through Underdrain:	98.61

Discharge Structure

Riser Height:	0.67 ft.
Riser Diameter:	18 in.

Element Flows To:

Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0367	0.0000	0.0000	0.0000
0.0412	0.0367	0.0005	0.0000	0.0000
0.0824	0.0367	0.0009	0.0000	0.0000
0.1236	0.0367	0.0014	0.0000	0.0000
0.1648	0.0367	0.0018	0.0000	0.0000
0.2060	0.0367	0.0023	0.0000	0.0000
0.2473	0.0367	0.0027	0.0000	0.0000
0.2885	0.0367	0.0032	0.0000	0.0000
0.3297	0.0367	0.0036	0.0000	0.0000
0.3709	0.0367	0.0041	0.0000	0.0000
0.4121	0.0367	0.0045	0.0000	0.0000
0.4533	0.0367	0.0050	0.0000	0.0000
0.4945	0.0367	0.0054	0.0000	0.0000
0.5357	0.0367	0.0059	0.0000	0.0000
0.5769	0.0367	0.0064	0.0000	0.0000
0.6181	0.0367	0.0068	0.0000	0.0000
0.6593	0.0367	0.0073	0.0000	0.0000
0.7005	0.0367	0.0077	0.0000	0.0000
0.7418	0.0367	0.0082	0.0000	0.0000
0.7830	0.0367	0.0086	0.0000	0.0000
0.8242	0.0367	0.0091	0.0000	0.0000
0.8654	0.0367	0.0095	0.0000	0.0000
0.9066	0.0367	0.0100	0.0000	0.0000
0.9478	0.0367	0.0104	0.0000	0.0000
0.9890	0.0367	0.0109	0.0000	0.0000
1.0302	0.0367	0.0114	0.0000	0.0000
1.0714	0.0367	0.0118	0.0000	0.0000
1.1126	0.0367	0.0123	0.0004	0.0000
1.1538	0.0367	0.0127	0.0006	0.0000

1.1951	0.0367	0.0132	0.0009	0.0000
1.2363	0.0367	0.0136	0.0011	0.0000
1.2775	0.0367	0.0141	0.0014	0.0000
1.3187	0.0367	0.0145	0.0015	0.0000
1.3599	0.0367	0.0150	0.0017	0.0000
1.4011	0.0367	0.0154	0.0018	0.0000
1.4423	0.0367	0.0159	0.0020	0.0000
1.4835	0.0367	0.0163	0.0020	0.0000
1.5247	0.0367	0.0168	0.0022	0.0000
1.5659	0.0367	0.0173	0.0023	0.0000
1.6071	0.0367	0.0177	0.0024	0.0000
1.6484	0.0367	0.0182	0.0025	0.0000
1.6896	0.0367	0.0186	0.0026	0.0000
1.7308	0.0367	0.0191	0.0027	0.0000
1.7720	0.0367	0.0197	0.0028	0.0000
1.8132	0.0367	0.0203	0.0028	0.0000
1.8544	0.0367	0.0210	0.0029	0.0000
1.8956	0.0367	0.0216	0.0030	0.0000
1.9368	0.0367	0.0222	0.0031	0.0000
1.9780	0.0367	0.0228	0.0032	0.0000
2.0192	0.0367	0.0235	0.0033	0.0000
2.0604	0.0367	0.0241	0.0033	0.0000
2.1016	0.0367	0.0247	0.0034	0.0000
2.1429	0.0367	0.0254	0.0034	0.0000
2.1841	0.0367	0.0260	0.0035	0.0000
2.2253	0.0367	0.0266	0.0035	0.0000
2.2665	0.0367	0.0272	0.0035	0.0000
2.3077	0.0367	0.0279	0.0036	0.0000
2.3489	0.0367	0.0285	0.0037	0.0000
2.3901	0.0367	0.0291	0.0038	0.0000
2.4313	0.0367	0.0298	0.0040	0.0000
2.4725	0.0367	0.0304	0.0043	0.0000
2.5137	0.0367	0.0310	0.0045	0.0000
2.5549	0.0367	0.0316	0.0047	0.0000
2.5962	0.0367	0.0323	0.0049	0.0000
2.6374	0.0367	0.0329	0.0051	0.0000
2.6786	0.0367	0.0335	0.0053	0.0000
2.7198	0.0367	0.0341	0.0055	0.0000
2.7500	0.0367	0.0346	0.0107	0.0000

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
2.7500	0.0367	0.0346	0.0000	0.1895	0.0000
2.7912	0.0372	0.0361	0.0000	0.1895	0.0000
2.8324	0.0376	0.0377	0.0000	0.1939	0.0000
2.8736	0.0381	0.0392	0.0000	0.1983	0.0000
2.9148	0.0386	0.0408	0.0000	0.2026	0.0000
2.9560	0.0390	0.0424	0.0000	0.2070	0.0000
2.9973	0.0395	0.0440	0.0000	0.2113	0.0000
3.0385	0.0400	0.0457	0.0000	0.2157	0.0000
3.0797	0.0405	0.0473	0.0000	0.2201	0.0000
3.1209	0.0409	0.0490	0.0000	0.2244	0.0000
3.1621	0.0414	0.0507	0.0000	0.2288	0.0000
3.2033	0.0419	0.0524	0.0000	0.2332	0.0000
3.2445	0.0424	0.0542	0.0000	0.2375	0.0000
3.2857	0.0429	0.0559	0.0000	0.2419	0.0000
3.3269	0.0434	0.0577	0.0000	0.2462	0.0000
3.3681	0.0439	0.0595	0.0000	0.2506	0.0000

3.4093	0.0444	0.0613	0.0000	0.2550	0.0000
3.4505	0.0449	0.0631	0.0850	0.2593	0.0000
3.4918	0.0454	0.0650	0.3056	0.2637	0.0000
3.5330	0.0459	0.0669	0.6025	0.2680	0.0000
3.5742	0.0464	0.0688	0.9573	0.2724	0.0000
3.6154	0.0469	0.0707	1.3573	0.2768	0.0000
3.6566	0.0474	0.0726	1.7916	0.2811	0.0000
3.6978	0.0479	0.0746	2.2491	0.2855	0.0000
3.7390	0.0484	0.0766	2.7186	0.2898	0.0000
3.7500	0.0486	0.0771	3.1887	0.2910	0.0000

Surface BMP #4

Element Flows To:

Outlet 1	Outlet 2
	BMP #4

BMP #5

Bottom Length: 39.00 ft.
Bottom Width: 39.00 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
Material type for third layer: GRAVEL
Underdrain used
Underdrain Diameter (feet): 0.67
Orifice Diameter (in.): 0.5
Offset (in.): 3
Flow Through Underdrain (ac-ft.): 8.362
Total Outflow (ac-ft.): 11.921
Percent Through Underdrain: 70.15
Discharge Structure
Riser Height: 0.67 ft.
Riser Diameter: 18 in.
Element Flows To:
Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0349	0.0000	0.0000	0.0000
0.0412	0.0349	0.0004	0.0000	0.0000
0.0824	0.0349	0.0009	0.0000	0.0000
0.1236	0.0349	0.0013	0.0000	0.0000
0.1648	0.0349	0.0017	0.0000	0.0000
0.2060	0.0349	0.0022	0.0000	0.0000
0.2473	0.0349	0.0026	0.0000	0.0000
0.2885	0.0349	0.0030	0.0000	0.0000
0.3297	0.0349	0.0035	0.0000	0.0000
0.3709	0.0349	0.0039	0.0000	0.0000
0.4121	0.0349	0.0043	0.0000	0.0000
0.4533	0.0349	0.0047	0.0000	0.0000
0.4945	0.0349	0.0052	0.0000	0.0000
0.5357	0.0349	0.0056	0.0000	0.0000
0.5769	0.0349	0.0060	0.0000	0.0000
0.6181	0.0349	0.0065	0.0000	0.0000
0.6593	0.0349	0.0069	0.0000	0.0000
0.7005	0.0349	0.0073	0.0000	0.0000
0.7418	0.0349	0.0078	0.0000	0.0000
0.7830	0.0349	0.0082	0.0000	0.0000
0.8242	0.0349	0.0086	0.0000	0.0000
0.8654	0.0349	0.0091	0.0000	0.0000
0.9066	0.0349	0.0095	0.0000	0.0000
0.9478	0.0349	0.0099	0.0000	0.0000
0.9890	0.0349	0.0104	0.0000	0.0000
1.0302	0.0349	0.0108	0.0000	0.0000
1.0714	0.0349	0.0112	0.0000	0.0000
1.1126	0.0349	0.0117	0.0004	0.0000
1.1538	0.0349	0.0121	0.0006	0.0000
1.1951	0.0349	0.0125	0.0009	0.0000
1.2363	0.0349	0.0130	0.0011	0.0000

1.2775	0.0349	0.0134	0.0014	0.0000
1.3187	0.0349	0.0138	0.0015	0.0000
1.3599	0.0349	0.0142	0.0017	0.0000
1.4011	0.0349	0.0147	0.0018	0.0000
1.4423	0.0349	0.0151	0.0020	0.0000
1.4835	0.0349	0.0155	0.0020	0.0000
1.5247	0.0349	0.0160	0.0022	0.0000
1.5659	0.0349	0.0164	0.0023	0.0000
1.6071	0.0349	0.0168	0.0024	0.0000
1.6484	0.0349	0.0173	0.0025	0.0000
1.6896	0.0349	0.0177	0.0026	0.0000
1.7308	0.0349	0.0181	0.0027	0.0000
1.7720	0.0349	0.0187	0.0028	0.0000
1.8132	0.0349	0.0193	0.0028	0.0000
1.8544	0.0349	0.0199	0.0029	0.0000
1.8956	0.0349	0.0205	0.0030	0.0000
1.9368	0.0349	0.0211	0.0031	0.0000
1.9780	0.0349	0.0217	0.0032	0.0000
2.0192	0.0349	0.0223	0.0033	0.0000
2.0604	0.0349	0.0229	0.0033	0.0000
2.1016	0.0349	0.0235	0.0034	0.0000
2.1429	0.0349	0.0241	0.0034	0.0000
2.1841	0.0349	0.0247	0.0035	0.0000
2.2253	0.0349	0.0253	0.0035	0.0000
2.2665	0.0349	0.0259	0.0035	0.0000
2.3077	0.0349	0.0265	0.0036	0.0000
2.3489	0.0349	0.0271	0.0037	0.0000
2.3901	0.0349	0.0277	0.0038	0.0000
2.4313	0.0349	0.0283	0.0040	0.0000
2.4725	0.0349	0.0289	0.0043	0.0000
2.5137	0.0349	0.0295	0.0045	0.0000
2.5549	0.0349	0.0301	0.0047	0.0000
2.5962	0.0349	0.0307	0.0049	0.0000
2.6374	0.0349	0.0313	0.0051	0.0000
2.6786	0.0349	0.0319	0.0053	0.0000
2.7198	0.0349	0.0325	0.0055	0.0000
2.7500	0.0349	0.0329	0.0107	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0349	0.0329	0.0000	0.1802	0.0000
2.7912	0.0354	0.0343	0.0000	0.1802	0.0000
2.8324	0.0358	0.0358	0.0000	0.1843	0.0000
2.8736	0.0363	0.0373	0.0000	0.1885	0.0000
2.9148	0.0367	0.0388	0.0000	0.1926	0.0000
2.9560	0.0372	0.0403	0.0000	0.1968	0.0000
2.9973	0.0376	0.0419	0.0000	0.2009	0.0000
3.0385	0.0381	0.0434	0.0000	0.2051	0.0000
3.0797	0.0385	0.0450	0.0000	0.2092	0.0000
3.1209	0.0390	0.0466	0.0000	0.2134	0.0000
3.1621	0.0395	0.0482	0.0000	0.2175	0.0000
3.2033	0.0400	0.0499	0.0000	0.2216	0.0000
3.2445	0.0404	0.0515	0.0000	0.2258	0.0000
3.2857	0.0409	0.0532	0.0000	0.2299	0.0000
3.3269	0.0414	0.0549	0.0000	0.2341	0.0000
3.3681	0.0419	0.0566	0.0000	0.2382	0.0000
3.4093	0.0424	0.0583	0.0000	0.2424	0.0000
3.4505	0.0428	0.0601	0.0850	0.2465	0.0000

3.4918	0.0433	0.0619	0.3056	0.2507	0.0000
3.5330	0.0438	0.0637	0.6025	0.2548	0.0000
3.5742	0.0443	0.0655	0.9573	0.2590	0.0000
3.6154	0.0448	0.0673	1.3573	0.2631	0.0000
3.6566	0.0453	0.0692	1.7916	0.2672	0.0000
3.6978	0.0458	0.0711	2.2491	0.2714	0.0000
3.7390	0.0464	0.0730	2.7186	0.2755	0.0000
3.7500	0.0465	0.0735	3.1887	0.2766	0.0000

Surface BMP #5

Element Flows To:

Outlet 1	Outlet 2
	BMP #5

BMP #8

Width:	28 ft.	
Length:	30 ft.	
Depth:	3.5 ft.	
Discharge Structure		
Riser Height:	3 ft.	
Riser Diameter:	18 in.	
Orifice 1 Diameter:	0.7 in.	Elevation:0 ft.

Element Flows To:
Outlet 1 Outlet 2

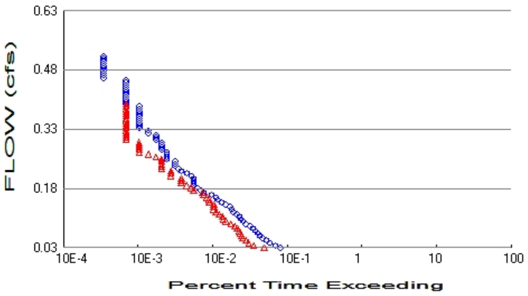
Vault Hydraulic Table

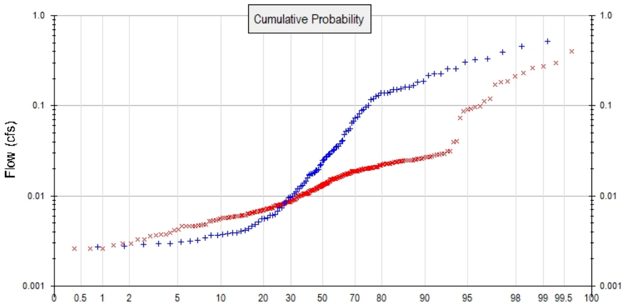
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.019	0.000	0.000	0.000
0.0389	0.019	0.000	0.001	0.000
0.0778	0.019	0.001	0.003	0.000
0.1167	0.019	0.002	0.004	0.000
0.1556	0.019	0.003	0.005	0.000
0.1944	0.019	0.003	0.005	0.000
0.2333	0.019	0.004	0.006	0.000
0.2722	0.019	0.005	0.006	0.000
0.3111	0.019	0.006	0.007	0.000
0.3500	0.019	0.006	0.007	0.000
0.3889	0.019	0.007	0.008	0.000
0.4278	0.019	0.008	0.008	0.000
0.4667	0.019	0.009	0.009	0.000
0.5056	0.019	0.009	0.009	0.000
0.5444	0.019	0.010	0.009	0.000
0.5833	0.019	0.011	0.010	0.000
0.6222	0.019	0.012	0.010	0.000
0.6611	0.019	0.012	0.010	0.000
0.7000	0.019	0.013	0.011	0.000
0.7389	0.019	0.014	0.011	0.000
0.7778	0.019	0.015	0.011	0.000
0.8167	0.019	0.015	0.012	0.000
0.8556	0.019	0.016	0.012	0.000
0.8944	0.019	0.017	0.012	0.000
0.9333	0.019	0.018	0.012	0.000
0.9722	0.019	0.018	0.013	0.000
1.0111	0.019	0.019	0.013	0.000
1.0500	0.019	0.020	0.013	0.000
1.0889	0.019	0.021	0.013	0.000
1.1278	0.019	0.021	0.014	0.000
1.1667	0.019	0.022	0.014	0.000
1.2056	0.019	0.023	0.014	0.000
1.2444	0.019	0.024	0.014	0.000
1.2833	0.019	0.024	0.015	0.000
1.3222	0.019	0.025	0.015	0.000
1.3611	0.019	0.026	0.015	0.000
1.4000	0.019	0.027	0.015	0.000
1.4389	0.019	0.027	0.016	0.000
1.4778	0.019	0.028	0.016	0.000
1.5167	0.019	0.029	0.016	0.000
1.5556	0.019	0.030	0.016	0.000
1.5944	0.019	0.030	0.016	0.000

1.6333	0.019	0.031	0.017	0.000
1.6722	0.019	0.032	0.017	0.000
1.7111	0.019	0.033	0.017	0.000
1.7500	0.019	0.033	0.017	0.000
1.7889	0.019	0.034	0.017	0.000
1.8278	0.019	0.035	0.018	0.000
1.8667	0.019	0.036	0.018	0.000
1.9056	0.019	0.036	0.018	0.000
1.9444	0.019	0.037	0.018	0.000
1.9833	0.019	0.038	0.018	0.000
2.0222	0.019	0.039	0.018	0.000
2.0611	0.019	0.039	0.019	0.000
2.1000	0.019	0.040	0.019	0.000
2.1389	0.019	0.041	0.019	0.000
2.1778	0.019	0.042	0.019	0.000
2.2167	0.019	0.042	0.019	0.000
2.2556	0.019	0.043	0.020	0.000
2.2944	0.019	0.044	0.020	0.000
2.3333	0.019	0.045	0.020	0.000
2.3722	0.019	0.045	0.020	0.000
2.4111	0.019	0.046	0.020	0.000
2.4500	0.019	0.047	0.020	0.000
2.4889	0.019	0.048	0.021	0.000
2.5278	0.019	0.048	0.021	0.000
2.5667	0.019	0.049	0.021	0.000
2.6056	0.019	0.050	0.021	0.000
2.6444	0.019	0.051	0.021	0.000
2.6833	0.019	0.051	0.021	0.000
2.7222	0.019	0.052	0.021	0.000
2.7611	0.019	0.053	0.022	0.000
2.8000	0.019	0.054	0.022	0.000
2.8389	0.019	0.054	0.022	0.000
2.8778	0.019	0.055	0.022	0.000
2.9167	0.019	0.056	0.022	0.000
2.9556	0.019	0.057	0.022	0.000
2.9944	0.019	0.057	0.023	0.000
3.0333	0.019	0.058	0.120	0.000
3.0722	0.019	0.059	0.331	0.000
3.1111	0.019	0.060	0.611	0.000
3.1500	0.019	0.060	0.942	0.000
3.1889	0.019	0.061	1.315	0.000
3.2278	0.019	0.062	1.720	0.000
3.2667	0.019	0.063	2.147	0.000
3.3056	0.019	0.063	2.588	0.000
3.3444	0.019	0.064	3.033	0.000
3.3833	0.019	0.065	3.472	0.000
3.4222	0.019	0.066	3.896	0.000
3.4611	0.019	0.066	4.296	0.000
3.5000	0.019	0.067	4.664	0.000
3.5389	0.019	0.068	4.993	0.000
3.5778	0.000	0.000	5.281	0.000

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.24
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.445
Total Impervious Area: 1.135

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.155685
5 year	0.265139
10 year	0.366419
25 year	0.486108

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.072961
5 year	0.190356
10 year	0.26912
25 year	0.348527

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0327	232	141	60	Pass
0.0387	199	103	51	Pass
0.0448	168	88	52	Pass
0.0509	151	81	53	Pass
0.0569	136	73	53	Pass
0.0630	124	71	57	Pass
0.0691	116	68	58	Pass
0.0752	110	65	59	Pass
0.0812	100	62	62	Pass
0.0873	91	57	62	Pass
0.0934	81	51	62	Pass
0.0995	74	44	59	Pass
0.1055	69	40	57	Pass
0.1116	66	39	59	Pass
0.1177	61	35	57	Pass
0.1238	55	32	58	Pass
0.1298	52	30	57	Pass
0.1359	49	30	61	Pass
0.1420	43	30	69	Pass
0.1480	38	26	68	Pass
0.1541	34	26	76	Pass
0.1602	32	24	75	Pass
0.1663	28	22	78	Pass
0.1723	22	21	95	Pass
0.1784	20	16	80	Pass
0.1845	18	15	83	Pass
0.1906	16	13	81	Pass
0.1966	16	11	68	Pass
0.2027	16	11	68	Pass
0.2088	16	11	68	Pass
0.2148	15	8	53	Pass
0.2209	13	8	61	Pass
0.2270	11	8	72	Pass
0.2331	10	6	60	Pass
0.2391	9	6	66	Pass
0.2452	9	6	66	Pass
0.2513	9	6	66	Pass
0.2574	7	6	85	Pass
0.2634	7	5	71	Pass
0.2695	7	4	57	Pass
0.2756	7	3	42	Pass
0.2817	6	3	50	Pass
0.2877	6	3	50	Pass
0.2938	6	3	50	Pass
0.2999	6	3	50	Pass
0.3059	5	2	40	Pass
0.3120	5	2	40	Pass
0.3181	5	2	40	Pass
0.3242	4	2	50	Pass
0.3302	4	2	50	Pass
0.3363	3	2	66	Pass
0.3424	3	2	66	Pass
0.3485	3	2	66	Pass

0.3545	3	2	66	Pass
0.3606	3	2	66	Pass
0.3667	3	2	66	Pass
0.3728	3	2	66	Pass
0.3788	3	2	66	Pass
0.3849	3	2	66	Pass
0.3910	3	2	66	Pass
0.3970	2	2	100	Pass
0.4031	2	0	0	Pass
0.4092	2	0	0	Pass
0.4153	2	0	0	Pass
0.4213	2	0	0	Pass
0.4274	2	0	0	Pass
0.4335	2	0	0	Pass
0.4396	2	0	0	Pass
0.4456	2	0	0	Pass
0.4517	2	0	0	Pass
0.4578	2	0	0	Pass
0.4639	1	0	0	Pass
0.4699	1	0	0	Pass
0.4760	1	0	0	Pass
0.4821	1	0	0	Pass
0.4881	1	0	0	Pass
0.4942	1	0	0	Pass
0.5003	1	0	0	Pass
0.5064	1	0	0	Pass
0.5124	1	0	0	Pass
0.5185	1	0	0	Pass
0.5246	0	0	0	Pass
0.5307	0	0	0	Pass
0.5367	0	0	0	Pass
0.5428	0	0	0	Pass
0.5489	0	0	0	Pass
0.5549	0	0	0	Pass
0.5610	0	0	0	Pass
0.5671	0	0	0	Pass
0.5732	0	0	0	Pass
0.5792	0	0	0	Pass
0.5853	0	0	0	Pass
0.5914	0	0	0	Pass
0.5975	0	0	0	Pass
0.6035	0	0	0	Pass
0.6096	0	0	0	Pass
0.6157	0	0	0	Pass
0.6218	0	0	0	Pass
0.6278	0	0	0	Pass
0.6339	0	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

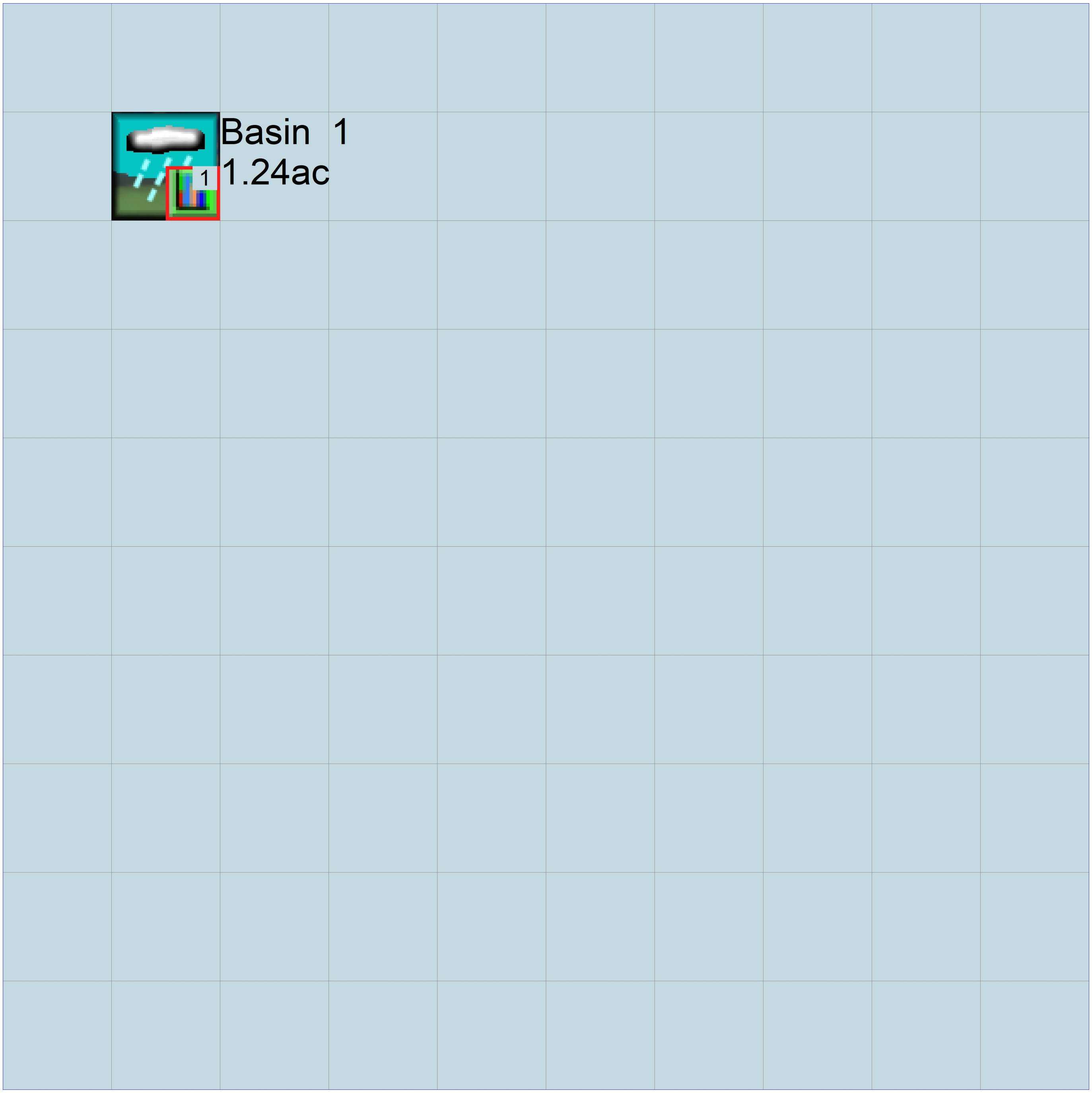
No PERLND changes have been made.

IMPLND Changes

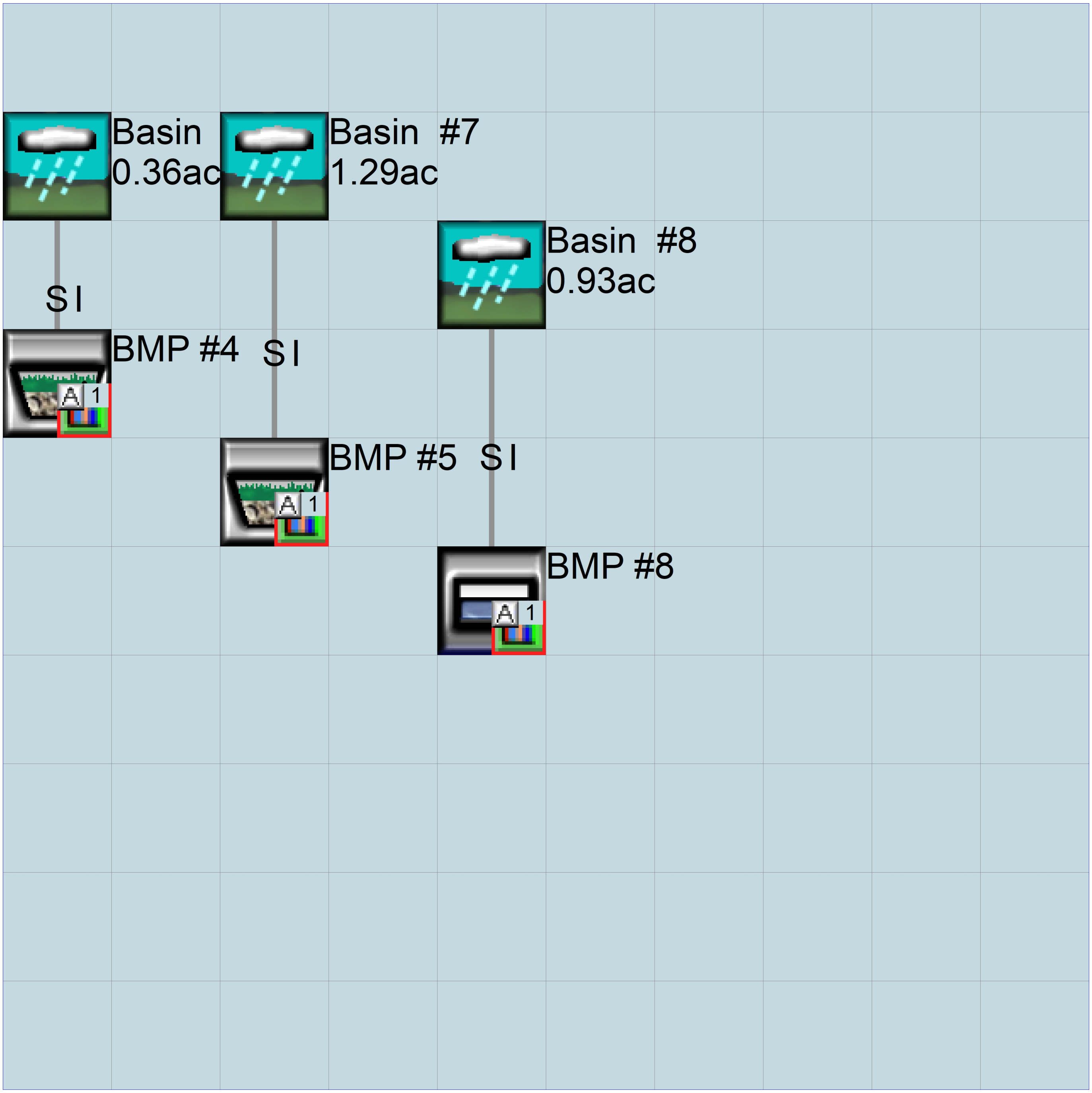
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   POC 3.wdm
MESSU      25   PrePOC 3.MES
           27   PrePOC 3.L61
           28   PrePOC 3.L62
           30   POCPOC 31.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      29
      COPY       501
      DISPLY       1
    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
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                            in  out           ***
   29      D,NatVeg,Moderate      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 ***
   29         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  *********
   29         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 ***
   29         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
   29              0         3     0.025        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   29              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 ***
   29              0       0.6      0.04         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  ***
   29      0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  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  ***
   29      0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  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
   29              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  29                        1.24     COPY   501     12
PERLND  29                        1.24     COPY   501     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



<-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
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       1971 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   POC 3.wdm
MESSU      25   MitPOC 3.MES
           27   MitPOC 3.L61
           28   MitPOC 3.L62
           30   POCPOC 31.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      46
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      RCHRES       5
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface BMP #4              MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1        1    1
  501        1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
    4        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   46      D,Urban,Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***
```

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

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

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

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

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

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   46              0         0      0.15         0         1      0.05         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  #6***
PERLND  46                        0.33     RCHRES   1      2
PERLND  46                        0.33     RCHRES   1      3
IMPLND   1                        0.03     RCHRES   1      5
Basin  #7***
PERLND  46                        0.75     RCHRES   3      2
PERLND  46                        0.75     RCHRES   3      3
IMPLND   1                        0.54     RCHRES   3      5
Basin  #8***
PERLND  46                       0.365     RCHRES   5      2
PERLND  46                       0.365     RCHRES   5      3
IMPLND   1                       0.565     RCHRES   5      5

******Routing******
PERLND  46                        0.33     COPY     1     12
IMPLND   1                        0.03     COPY     1     15
PERLND  46                        0.33     COPY     1     13
RCHRES   1                           1     RCHRES   2      8
RCHRES   3                           1     RCHRES   4      8
RCHRES   3                                 COPY     1     18
PERLND  46                       0.365     COPY     1     12
IMPLND   1                       0.565     COPY     1     15
PERLND  46                       0.365     COPY     1     13
RCHRES   2                           1     COPY   501     16
RCHRES   1                           1     COPY   501     17
RCHRES   4                           1     COPY   501     16
RCHRES   5                           1     COPY   501     16
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
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     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 BMP #4          3    1    1    1   28    0    1
    2     BMP #4                  1    1    1    1   28    0    1
    3     Surface BMP #5          3    1    1    1   28    0    1
    4     BMP #5                  1    1    1    1   28    0    1
    5     BMP #8                  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
  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
  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  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       0.0       0.5       0.0
    2             2      0.01       0.0       0.0       0.5       0.0
    3             3      0.01       0.0       0.0       0.5       0.0
    4             4      0.01       0.0       0.0       0.5       0.0
    5             5      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  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  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 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
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  1413.
*** 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            =  1343.
*** 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
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   68    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.036731  0.000000  0.000000
```

```
  0.041209  0.036731  0.000454  0.000000
  0.082418  0.036731  0.000908  0.000000
  0.123626  0.036731  0.001362  0.000000
  0.164835  0.036731  0.001816  0.000000
  0.206044  0.036731  0.002270  0.000000
  0.247253  0.036731  0.002725  0.000000
  0.288462  0.036731  0.003179  0.000000
  0.329670  0.036731  0.003633  0.000000
  0.370879  0.036731  0.004087  0.000000
  0.412088  0.036731  0.004541  0.000000
  0.453297  0.036731  0.004995  0.000000
  0.494505  0.036731  0.005449  0.000000
  0.535714  0.036731  0.005903  0.000000
  0.576923  0.036731  0.006357  0.000000
  0.618132  0.036731  0.006811  0.000000
  0.659341  0.036731  0.007265  0.000000
  0.700549  0.036731  0.007720  0.000000
  0.741758  0.036731  0.008174  0.000000
  0.782967  0.036731  0.008628  0.000000
  0.824176  0.036731  0.009082  0.000000
  0.865385  0.036731  0.009536  0.000000
  0.906593  0.036731  0.009990  0.000000
  0.947802  0.036731  0.010444  0.000000
  0.989011  0.036731  0.010898  0.000000
  1.030220  0.036731  0.011352  0.000000
  1.071429  0.036731  0.011806  0.000000
  1.112637  0.036731  0.012260  0.000398
  1.153846  0.036731  0.012715  0.000598
  1.195055  0.036731  0.013169  0.000932
  1.236264  0.036731  0.013623  0.001099
  1.277473  0.036731  0.014077  0.001352
  1.318681  0.036731  0.014531  0.001478
  1.359890  0.036731  0.014985  0.001679
  1.401099  0.036731  0.015439  0.001780
  1.442308  0.036731  0.015893  0.001952
  1.483516  0.036731  0.016347  0.002037
  1.524725  0.036731  0.016801  0.002188
  1.565934  0.036731  0.017255  0.002264
  1.607143  0.036731  0.017710  0.002401
  1.648352  0.036731  0.018164  0.002469
  1.689560  0.036731  0.018618  0.002595
  1.730769  0.036731  0.019072  0.002658
  1.771978  0.036731  0.019700  0.002775
  1.813187  0.036731  0.020328  0.002834
  1.854396  0.036731  0.020956  0.002945
  1.895604  0.036731  0.021584  0.003000
  1.936813  0.036731  0.022213  0.003104
  1.978022  0.036731  0.022841  0.003157
  2.019231  0.036731  0.023469  0.003256
  2.060440  0.036731  0.024097  0.003306
  2.101648  0.036731  0.024725  0.003401
  2.142857  0.036731  0.025353  0.003449
  2.184066  0.036731  0.025982  0.003541
  2.225275  0.036731  0.026610  0.003509
  2.266484  0.036731  0.027238  0.003503
  2.307692  0.036731  0.027866  0.003559
  2.348901  0.036731  0.028494  0.003665
  2.390110  0.036731  0.029122  0.003842
  2.431319  0.036731  0.029751  0.004047
  2.472527  0.036731  0.030379  0.004260
  2.513736  0.036731  0.031007  0.004472
  2.554945  0.036731  0.031635  0.004680
  2.596154  0.036731  0.032263  0.004881
  2.637363  0.036731  0.032891  0.005076
  2.678571  0.036731  0.033520  0.005265
  2.719780  0.036731  0.034148  0.005451
  2.750000  0.036731  0.072677  0.010727
  END FTABLE  2
  FTABLE      1
   26    6
```

```
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.036731  0.000000  0.000000  0.000000  0.000000
  0.041209  0.037186  0.001523  0.000000  0.189546  0.000000
  0.082418  0.037645  0.003065  0.000000  0.193907  0.000000
  0.123626  0.038106  0.004626  0.000000  0.198267  0.000000
  0.164835  0.038570  0.006206  0.000000  0.202628  0.000000
  0.206044  0.039036  0.007805  0.000000  0.206989  0.000000
  0.247253  0.039506  0.009423  0.000000  0.211350  0.000000
  0.288462  0.039978  0.011061  0.000000  0.215710  0.000000
  0.329670  0.040453  0.012718  0.000000  0.220071  0.000000
  0.370879  0.040931  0.014395  0.000000  0.224432  0.000000
  0.412088  0.041412  0.016091  0.000000  0.228793  0.000000
  0.453297  0.041896  0.017808  0.000000  0.233153  0.000000
  0.494505  0.042382  0.019544  0.000000  0.237514  0.000000
  0.535714  0.042871  0.021301  0.000000  0.241875  0.000000
  0.576923  0.043363  0.023078  0.000000  0.246235  0.000000
  0.618132  0.043858  0.024875  0.000000  0.250596  0.000000
  0.659341  0.044356  0.026693  0.000000  0.254957  0.000000
  0.700549  0.044856  0.028531  0.084983  0.259318  0.000000
  0.741758  0.045359  0.030390  0.305594  0.263678  0.000000
  0.782967  0.045865  0.032269  0.602527  0.268039  0.000000
  0.824176  0.046374  0.034170  0.957276  0.272400  0.000000
  0.865385  0.046886  0.036091  1.357327  0.276760  0.000000
  0.906593  0.047400  0.038034  1.791597  0.281121  0.000000
  0.947802  0.047917  0.039998  2.249112  0.285482  0.000000
  0.989011  0.048438  0.041983  2.718627  0.289843  0.000000
  1.000000  0.048577  0.042516  3.188669  0.291006  0.000000
  END FTABLE  1
  FTABLE      4
   68    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.034917  0.000000  0.000000
  0.041209  0.034917  0.000432  0.000000
  0.082418  0.034917  0.000863  0.000000
  0.123626  0.034917  0.001295  0.000000
  0.164835  0.034917  0.001727  0.000000
  0.206044  0.034917  0.002158  0.000000
  0.247253  0.034917  0.002590  0.000000
  0.288462  0.034917  0.003022  0.000000
  0.329670  0.034917  0.003453  0.000000
  0.370879  0.034917  0.003885  0.000000
  0.412088  0.034917  0.004317  0.000000
  0.453297  0.034917  0.004748  0.000000
  0.494505  0.034917  0.005180  0.000000
  0.535714  0.034917  0.005612  0.000000
  0.576923  0.034917  0.006043  0.000000
  0.618132  0.034917  0.006475  0.000000
  0.659341  0.034917  0.006907  0.000000
  0.700549  0.034917  0.007338  0.000000
  0.741758  0.034917  0.007770  0.000000
  0.782967  0.034917  0.008202  0.000000
  0.824176  0.034917  0.008633  0.000000
  0.865385  0.034917  0.009065  0.000000
  0.906593  0.034917  0.009497  0.000000
  0.947802  0.034917  0.009928  0.000000
  0.989011  0.034917  0.010360  0.000000
  1.030220  0.034917  0.010792  0.000000
  1.071429  0.034917  0.011223  0.000000
  1.112637  0.034917  0.011655  0.000398
  1.153846  0.034917  0.012087  0.000598
  1.195055  0.034917  0.012518  0.000932
  1.236264  0.034917  0.012950  0.001099
  1.277473  0.034917  0.013382  0.001352
  1.318681  0.034917  0.013813  0.001478
  1.359890  0.034917  0.014245  0.001679
  1.401099  0.034917  0.014677  0.001780
```

```
  1.442308  0.034917  0.015108  0.001952
  1.483516  0.034917  0.015540  0.002037
  1.524725  0.034917  0.015972  0.002188
  1.565934  0.034917  0.016403  0.002264
  1.607143  0.034917  0.016835  0.002401
  1.648352  0.034917  0.017267  0.002469
  1.689560  0.034917  0.017698  0.002595
  1.730769  0.034917  0.018130  0.002658
  1.771978  0.034917  0.018727  0.002775
  1.813187  0.034917  0.019324  0.002834
  1.854396  0.034917  0.019922  0.002945
  1.895604  0.034917  0.020519  0.003000
  1.936813  0.034917  0.021116  0.003104
  1.978022  0.034917  0.021713  0.003157
  2.019231  0.034917  0.022310  0.003256
  2.060440  0.034917  0.022907  0.003306
  2.101648  0.034917  0.023504  0.003401
  2.142857  0.034917  0.024102  0.003449
  2.184066  0.034917  0.024699  0.003541
  2.225275  0.034917  0.025296  0.003509
  2.266484  0.034917  0.025893  0.003503
  2.307692  0.034917  0.026490  0.003559
  2.348901  0.034917  0.027087  0.003665
  2.390110  0.034917  0.027684  0.003842
  2.431319  0.034917  0.028282  0.004047
  2.472527  0.034917  0.028879  0.004260
  2.513736  0.034917  0.029476  0.004472
  2.554945  0.034917  0.030073  0.004680
  2.596154  0.034917  0.030670  0.004881
  2.637363  0.034917  0.031267  0.005076
  2.678571  0.034917  0.031864  0.005265
  2.719780  0.034917  0.032462  0.005451
  2.750000  0.034917  0.069089  0.010727
  END FTABLE  4
  FTABLE      3
   26    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.034917  0.000000  0.000000  0.000000  0.000000
  0.041209  0.035361  0.001448  0.000000  0.180187  0.000000
  0.082418  0.035808  0.002914  0.000000  0.184333  0.000000
  0.123626  0.036258  0.004399  0.000000  0.188478  0.000000
  0.164835  0.036711  0.005903  0.000000  0.192623  0.000000
  0.206044  0.037166  0.007425  0.000000  0.196769  0.000000
  0.247253  0.037624  0.008966  0.000000  0.200914  0.000000
  0.288462  0.038085  0.010526  0.000000  0.205060  0.000000
  0.329670  0.038549  0.012105  0.000000  0.209205  0.000000
  0.370879  0.039016  0.013703  0.000000  0.213351  0.000000
  0.412088  0.039485  0.015321  0.000000  0.217496  0.000000
  0.453297  0.039957  0.016957  0.000000  0.221641  0.000000
  0.494505  0.040432  0.018614  0.000000  0.225787  0.000000
  0.535714  0.040910  0.020290  0.000000  0.229932  0.000000
  0.576923  0.041391  0.021986  0.000000  0.234078  0.000000
  0.618132  0.041874  0.023701  0.000000  0.238223  0.000000
  0.659341  0.042360  0.025437  0.000000  0.242368  0.000000
  0.700549  0.042850  0.027193  0.084983  0.246514  0.000000
  0.741758  0.043341  0.028968  0.305594  0.250659  0.000000
  0.782967  0.043836  0.030765  0.602527  0.254805  0.000000
  0.824176  0.044334  0.032581  0.957276  0.258950  0.000000
  0.865385  0.044834  0.034419  1.357327  0.263095  0.000000
  0.906593  0.045337  0.036277  1.791597  0.267241  0.000000
  0.947802  0.045843  0.038155  2.249112  0.271386  0.000000
  0.989011  0.046351  0.040055  2.718627  0.275532  0.000000
  1.000000  0.046488  0.040565  3.188669  0.276637  0.000000
  END FTABLE  3
  FTABLE      5
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
```

```
     (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
 0.000000  0.019284  0.000000  0.000000
 0.038889  0.019284  0.000750  0.001857
 0.077778  0.019284  0.001500  0.003708
 0.116667  0.019284  0.002250  0.004542
 0.155556  0.019284  0.003000  0.005244
 0.194444  0.019284  0.003750  0.005863
 0.233333  0.019284  0.004500  0.006423
 0.272222  0.019284  0.005249  0.006938
 0.311111  0.019284  0.005999  0.007417
 0.350000  0.019284  0.006749  0.007867
 0.388889  0.019284  0.007499  0.008292
 0.427778  0.019284  0.008249  0.008697
 0.466667  0.019284  0.008999  0.009084
 0.505556  0.019284  0.009749  0.009455
 0.544444  0.019284  0.010499  0.009811
 0.583333  0.019284  0.011249  0.010156
 0.622222  0.019284  0.011999  0.010489
 0.661111  0.019284  0.012749  0.010812
 0.700000  0.019284  0.013499  0.011125
 0.738889  0.019284  0.014249  0.011430
 0.777778  0.019284  0.014998  0.011727
 0.816667  0.019284  0.015748  0.012016
 0.855556  0.019284  0.016498  0.012299
 0.894444  0.019284  0.017248  0.012576
 0.933333  0.019284  0.017998  0.012846
 0.972222  0.019284  0.018748  0.013111
 1.011111  0.019284  0.019498  0.013371
 1.050000  0.019284  0.020248  0.013625
 1.088889  0.019284  0.020998  0.013875
 1.127778  0.019284  0.021748  0.014121
 1.166667  0.019284  0.022498  0.014362
 1.205556  0.019284  0.023248  0.014600
 1.244444  0.019284  0.023998  0.014833
 1.283333  0.019284  0.024747  0.015063
 1.322222  0.019284  0.025497  0.015290
 1.361111  0.019284  0.026247  0.015513
 1.400000  0.019284  0.026997  0.015733
 1.438889  0.019284  0.027747  0.015950
 1.477778  0.019284  0.028497  0.016164
 1.516667  0.019284  0.029247  0.016376
 1.555556  0.019284  0.029997  0.016584
 1.594444  0.019284  0.030747  0.016790
 1.633333  0.019284  0.031497  0.016994
 1.672222  0.019284  0.032247  0.017195
 1.711111  0.019284  0.032997  0.017394
 1.750000  0.019284  0.033747  0.017590
 1.788889  0.019284  0.034496  0.017785
 1.827778  0.019284  0.035246  0.017977
 1.866667  0.019284  0.035996  0.018167
 1.905556  0.019284  0.036746  0.018355
 1.944444  0.019284  0.037496  0.018542
 1.983333  0.019284  0.038246  0.018726
 2.022222  0.019284  0.038996  0.018909
 2.061111  0.019284  0.039746  0.019090
 2.100000  0.019284  0.040496  0.019269
 2.138889  0.019284  0.041246  0.019447
 2.177778  0.019284  0.041996  0.019623
 2.216667  0.019284  0.042746  0.019797
 2.255556  0.019284  0.043496  0.019970
 2.294444  0.019284  0.044245  0.020142
 2.333333  0.019284  0.044995  0.020312
 2.372222  0.019284  0.045745  0.020480
 2.411111  0.019284  0.046495  0.020647
 2.450000  0.019284  0.047245  0.020813
 2.488889  0.019284  0.047995  0.020978
 2.527778  0.019284  0.048745  0.021141
 2.566667  0.019284  0.049495  0.021303
 2.605556  0.019284  0.050245  0.021464
 2.644444  0.019284  0.050995  0.021623
```

```
  2.683333  0.019284  0.051745  0.021782
  2.722222  0.019284  0.052495  0.021939
  2.761111  0.019284  0.053245  0.022095
  2.800000  0.019284  0.053994  0.022250
  2.838889  0.019284  0.054744  0.022404
  2.877778  0.019284  0.055494  0.022557
  2.916667  0.019284  0.056244  0.022709
  2.955556  0.019284  0.056994  0.022860
  2.994444  0.019284  0.057744  0.023010
  3.033333  0.019284  0.058494  0.120011
  3.072222  0.019284  0.059244  0.331865
  3.111111  0.019284  0.059994  0.611259
  3.150000  0.019284  0.060744  0.942674
  3.188889  0.019284  0.061494  1.315461
  3.227778  0.019284  0.062244  1.720254
  3.266667  0.019284  0.062994  2.147856
  3.305556  0.019284  0.063743  2.588879
  3.344444  0.019284  0.064493  3.033718
  3.383333  0.019284  0.065243  3.472717
  3.422222  0.019284  0.065993  3.896455
  3.461111  0.019284  0.066743  4.296123
  3.500000  0.019284  0.067493  4.663968
  3.538889  0.019284  0.068243  4.993803
  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     22 IRRG     ENGL    0.7       SAME PERLND  46     EXTNL  SURLI
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   3     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

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   5 HYDR   RO     1 1        1      WDM   1008 FLOW     ENGL      REPL
RCHRES   5 HYDR   STAGE  1 1        1      WDM   1009 STAG     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

  MASS-LINK       18
RCHRES     OFLOW  OVOL   2                 COPY           INPUT  MEAN
  END MASS-LINK   18

END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	POC 4
Site Name:	Beyer Park
Site Address:	
City:	San Diego
Report Date:	8/21/2018
Gage:	BONITA
Data Start:	10/01/1971
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/07/12

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin D

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Moderate	3.08
Pervious Total	3.08
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.08

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin D-1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Moderate	0.88
Pervious Total	0.88
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.46
Impervious Total	0.46
Basin Total	1.34

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP #7	Surface BMP #7	

Basin D-2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Moderate	1.02
D,UrbNoIrr,Flat	0.04
Pervious Total	1.06
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.55
Impervious Total	0.55
Basin Total	1.61

Element Flows To:

Surface	Interflow	Groundwater
Surface BMP #6	Surface BMP #6	

Routing Elements

Predeveloped Routing

Mitigated Routing

BMP #6

Bottom Length:	55.00 ft.
Bottom Width:	55.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.75
Material type for second layer:	ESM
Material thickness of third layer:	3
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.67
Orifice Diameter (in.):	0.48
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	11.834
Total Outflow (ac-ft.):	13.15
Percent Through Underdrain:	89.99

Discharge Structure

Riser Height:	1 ft.
Riser Diameter:	18 in.

Element Flows To:

Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.0694	0.0000	0.0000	0.0000
0.0714	0.0694	0.0015	0.0000	0.0000
0.1429	0.0694	0.0030	0.0000	0.0000
0.2143	0.0694	0.0045	0.0000	0.0000
0.2857	0.0694	0.0060	0.0000	0.0000
0.3571	0.0694	0.0074	0.0000	0.0000
0.4286	0.0694	0.0089	0.0000	0.0000
0.5000	0.0694	0.0104	0.0000	0.0000
0.5714	0.0694	0.0119	0.0000	0.0000
0.6429	0.0694	0.0134	0.0000	0.0000
0.7143	0.0694	0.0149	0.0000	0.0000
0.7857	0.0694	0.0164	0.0000	0.0000
0.8571	0.0694	0.0179	0.0000	0.0000
0.9286	0.0694	0.0193	0.0000	0.0000
1.0000	0.0694	0.0208	0.0000	0.0000
1.0714	0.0694	0.0223	0.0000	0.0000
1.1429	0.0694	0.0238	0.0000	0.0000
1.2143	0.0694	0.0253	0.0004	0.0000
1.2857	0.0694	0.0268	0.0007	0.0000
1.3571	0.0694	0.0283	0.0011	0.0000
1.4286	0.0694	0.0298	0.0013	0.0000
1.5000	0.0694	0.0313	0.0016	0.0000
1.5714	0.0694	0.0327	0.0017	0.0000
1.6429	0.0694	0.0342	0.0020	0.0000
1.7143	0.0694	0.0357	0.0021	0.0000
1.7857	0.0694	0.0372	0.0023	0.0000
1.8571	0.0694	0.0387	0.0024	0.0000
1.9286	0.0694	0.0402	0.0026	0.0000
2.0000	0.0694	0.0417	0.0027	0.0000

2.0714	0.0694	0.0437	0.0029	0.0000
2.1429	0.0694	0.0458	0.0030	0.0000
2.2143	0.0694	0.0478	0.0031	0.0000
2.2857	0.0694	0.0499	0.0032	0.0000
2.3571	0.0694	0.0520	0.0033	0.0000
2.4286	0.0694	0.0540	0.0033	0.0000
2.5000	0.0694	0.0561	0.0033	0.0000
2.5714	0.0694	0.0581	0.0034	0.0000
2.6429	0.0694	0.0602	0.0035	0.0000
2.7143	0.0694	0.0623	0.0038	0.0000
2.7857	0.0694	0.0643	0.0041	0.0000
2.8571	0.0694	0.0664	0.0044	0.0000
2.9286	0.0694	0.0684	0.0047	0.0000
3.0000	0.0694	0.0705	0.0050	0.0000
3.0714	0.0694	0.0725	0.0052	0.0000
3.1429	0.0694	0.0746	0.0055	0.0000
3.2143	0.0694	0.0767	0.0057	0.0000
3.2857	0.0694	0.0787	0.0060	0.0000
3.3571	0.0694	0.0808	0.0062	0.0000
3.4286	0.0694	0.0828	0.0064	0.0000
3.5000	0.0694	0.0849	0.0067	0.0000
3.5714	0.0694	0.0870	0.0069	0.0000
3.6429	0.0694	0.0890	0.0071	0.0000
3.7143	0.0694	0.0911	0.0073	0.0000
3.7857	0.0694	0.0931	0.0075	0.0000
3.8571	0.0694	0.0952	0.0076	0.0000
3.9286	0.0694	0.0972	0.0078	0.0000
4.0000	0.0694	0.0993	0.0080	0.0000
4.0714	0.0694	0.1014	0.0082	0.0000
4.1429	0.0694	0.1034	0.0083	0.0000
4.2143	0.0694	0.1055	0.0085	0.0000
4.2857	0.0694	0.1075	0.0087	0.0000
4.3571	0.0694	0.1096	0.0088	0.0000
4.4286	0.0694	0.1117	0.0090	0.0000
4.5000	0.0694	0.1137	0.0091	0.0000
4.5714	0.0694	0.1158	0.0093	0.0000
4.6429	0.0694	0.1178	0.0095	0.0000
4.7143	0.0694	0.1199	0.0096	0.0000
4.7857	0.0694	0.1219	0.0097	0.0000
4.8571	0.0694	0.1240	0.0099	0.0000
4.9286	0.0694	0.1261	0.0100	0.0000
5.0000	0.0694	0.1281	0.0136	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
5.0000	0.0694	0.1281	0.0000	0.3626	0.0000
5.0714	0.0705	0.1331	0.0000	0.3626	0.0000
5.1429	0.0716	0.1382	0.0000	0.3751	0.0000
5.2143	0.0727	0.1434	0.0000	0.3876	0.0000
5.2857	0.0738	0.1486	0.0000	0.4001	0.0000
5.3571	0.0750	0.1539	0.0000	0.4126	0.0000
5.4286	0.0761	0.1593	0.0000	0.4251	0.0000
5.5000	0.0772	0.1648	0.0000	0.4376	0.0000
5.5714	0.0784	0.1703	0.0000	0.4501	0.0000
5.6429	0.0795	0.1760	0.0000	0.4627	0.0000
5.7143	0.0807	0.1817	0.0000	0.4752	0.0000
5.7857	0.0819	0.1875	0.0000	0.4877	0.0000
5.8571	0.0830	0.1934	0.0000	0.5002	0.0000

5.9286	0.0842	0.1994	0.0000	0.5127	0.0000
6.0000	0.0854	0.2054	0.0000	0.5252	0.0000
6.0714	0.0866	0.2116	0.3035	0.5377	0.0000
6.1429	0.0878	0.2178	0.8548	0.5502	0.0000
6.2143	0.0891	0.2241	1.5529	0.5627	0.0000
6.2857	0.0903	0.2305	2.3387	0.5752	0.0000
6.3571	0.0915	0.2370	3.1538	0.5877	0.0000
6.4286	0.0928	0.2436	3.9390	0.6002	0.0000
6.5000	0.0940	0.2503	4.6391	0.6127	0.0000
6.5000	0.0940	0.2503	5.2124	0.6127	0.0000

Surface BMP #6

Element Flows To:

Outlet 1	Outlet 2
	BMP #6

BMP #7

Bottom Length:	70.00 ft.
Bottom Width:	10.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.75
Material type for second layer:	ESM
Material thickness of third layer:	2
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.67
Orifice Diameter (in.):	0.8
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	9.234
Total Outflow (ac-ft.):	11.814
Percent Through Underdrain:	78.16

Discharge Structure

Riser Height:	0.67 ft.
Riser Diameter:	18 in.

Element Flows To:

Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0161	0.0000	0.0000	0.0000
0.0568	0.0161	0.0003	0.0000	0.0000
0.1136	0.0161	0.0005	0.0000	0.0000
0.1704	0.0161	0.0008	0.0000	0.0000
0.2273	0.0161	0.0011	0.0000	0.0000
0.2841	0.0161	0.0014	0.0000	0.0000
0.3409	0.0161	0.0016	0.0000	0.0000
0.3977	0.0161	0.0019	0.0000	0.0000
0.4545	0.0161	0.0022	0.0000	0.0000
0.5113	0.0161	0.0025	0.0000	0.0000
0.5681	0.0161	0.0027	0.0000	0.0000
0.6249	0.0161	0.0030	0.0000	0.0000
0.6818	0.0161	0.0033	0.0000	0.0000
0.7386	0.0161	0.0036	0.0000	0.0000
0.7954	0.0161	0.0038	0.0000	0.0000
0.8522	0.0161	0.0041	0.0000	0.0000
0.9090	0.0161	0.0044	0.0000	0.0000
0.9658	0.0161	0.0047	0.0000	0.0000
1.0226	0.0161	0.0049	0.0000	0.0000
1.0795	0.0161	0.0052	0.0010	0.0000
1.1363	0.0161	0.0055	0.0015	0.0000
1.1931	0.0161	0.0058	0.0025	0.0000
1.2499	0.0161	0.0060	0.0030	0.0000
1.3067	0.0161	0.0063	0.0038	0.0000
1.3635	0.0161	0.0066	0.0042	0.0000
1.4203	0.0161	0.0068	0.0048	0.0000
1.4771	0.0161	0.0071	0.0052	0.0000
1.5340	0.0161	0.0074	0.0057	0.0000
1.5908	0.0161	0.0077	0.0060	0.0000
1.6476	0.0161	0.0079	0.0064	0.0000
1.7044	0.0161	0.0082	0.0067	0.0000

1.7612	0.0161	0.0085	0.0071	0.0000
1.8180	0.0161	0.0088	0.0073	0.0000
1.8748	0.0161	0.0090	0.0077	0.0000
1.9316	0.0161	0.0093	0.0079	0.0000
1.9885	0.0161	0.0096	0.0082	0.0000
2.0453	0.0161	0.0100	0.0084	0.0000
2.1021	0.0161	0.0103	0.0087	0.0000
2.1589	0.0161	0.0107	0.0089	0.0000
2.2157	0.0161	0.0111	0.0092	0.0000
2.2725	0.0161	0.0115	0.0089	0.0000
2.3293	0.0161	0.0119	0.0090	0.0000
2.3862	0.0161	0.0122	0.0091	0.0000
2.4430	0.0161	0.0126	0.0093	0.0000
2.4998	0.0161	0.0130	0.0095	0.0000
2.5566	0.0161	0.0134	0.0097	0.0000
2.6134	0.0161	0.0138	0.0099	0.0000
2.6702	0.0161	0.0141	0.0103	0.0000
2.7270	0.0161	0.0145	0.0108	0.0000
2.7838	0.0161	0.0149	0.0115	0.0000
2.8407	0.0161	0.0153	0.0122	0.0000
2.8975	0.0161	0.0156	0.0128	0.0000
2.9543	0.0161	0.0160	0.0135	0.0000
3.0111	0.0161	0.0164	0.0141	0.0000
3.0679	0.0161	0.0168	0.0147	0.0000
3.1247	0.0161	0.0172	0.0153	0.0000
3.1815	0.0161	0.0175	0.0158	0.0000
3.2384	0.0161	0.0179	0.0164	0.0000
3.2952	0.0161	0.0183	0.0169	0.0000
3.3520	0.0161	0.0187	0.0174	0.0000
3.4088	0.0161	0.0191	0.0179	0.0000
3.4656	0.0161	0.0194	0.0184	0.0000
3.5224	0.0161	0.0198	0.0188	0.0000
3.5792	0.0161	0.0202	0.0193	0.0000
3.6360	0.0161	0.0206	0.0197	0.0000
3.6929	0.0161	0.0210	0.0202	0.0000
3.7497	0.0161	0.0213	0.0206	0.0000
3.8065	0.0161	0.0217	0.0210	0.0000
3.8633	0.0161	0.0221	0.0214	0.0000
3.9201	0.0161	0.0225	0.0218	0.0000
3.9769	0.0161	0.0228	0.0222	0.0000
4.0000	0.0161	0.0230	0.0336	0.0000

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
4.0000	0.0161	0.0230	0.0000	0.0833	0.0000
4.0568	0.0167	0.0239	0.0000	0.0833	0.0000
4.1136	0.0173	0.0249	0.0000	0.0856	0.0000
4.1704	0.0180	0.0259	0.0000	0.0879	0.0000
4.2273	0.0186	0.0269	0.0000	0.0902	0.0000
4.2841	0.0193	0.0280	0.0000	0.0925	0.0000
4.3409	0.0199	0.0291	0.0000	0.0948	0.0000
4.3977	0.0206	0.0303	0.0000	0.0971	0.0000
4.4545	0.0212	0.0315	0.0000	0.0994	0.0000
4.5113	0.0219	0.0327	0.0000	0.1017	0.0000
4.5681	0.0226	0.0340	0.0000	0.1040	0.0000
4.6249	0.0233	0.0353	0.0000	0.1063	0.0000
4.6818	0.0240	0.0366	0.0203	0.1086	0.0000
4.7386	0.0247	0.0380	0.2855	0.1109	0.0000

4.7954	0.0254	0.0394	0.7040	0.1132	0.0000
4.8522	0.0261	0.0409	1.2251	0.1155	0.0000
4.9090	0.0268	0.0424	1.8179	0.1178	0.0000
4.9658	0.0275	0.0439	2.4536	0.1201	0.0000
5.0226	0.0282	0.0455	3.1027	0.1224	0.0000
5.0795	0.0289	0.0471	3.7350	0.1247	0.0000
5.1363	0.0297	0.0488	4.3221	0.1270	0.0000
5.1700	0.0301	0.0498	4.8396	0.1284	0.0000

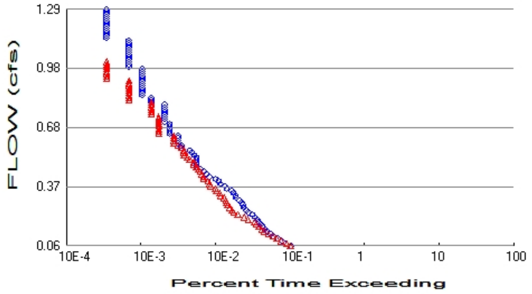
Surface BMP #7

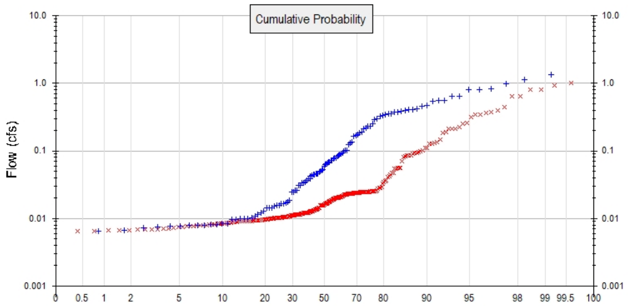
Element Flows To:

Outlet 1	Outlet 2
	BMP #7

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 3.08
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.94
Total Impervious Area: 1.01

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.393388
5 year	0.671973
10 year	0.912894
25 year	1.231615

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.212296
5 year	0.48362
10 year	0.812026
25 year	0.97135

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0602	296	293	98	Pass
0.0726	252	262	103	Pass
0.0851	226	221	97	Pass
0.0975	197	192	97	Pass
0.1100	173	170	98	Pass
0.1224	160	148	92	Pass
0.1349	142	131	92	Pass
0.1473	134	121	90	Pass
0.1598	124	111	89	Pass
0.1722	118	102	86	Pass
0.1846	110	97	88	Pass
0.1971	105	80	76	Pass
0.2095	98	70	71	Pass
0.2220	90	58	64	Pass
0.2344	80	51	63	Pass
0.2469	75	48	64	Pass
0.2593	70	45	64	Pass
0.2718	67	42	62	Pass
0.2842	65	41	63	Pass
0.2967	61	40	65	Pass
0.3091	55	38	69	Pass
0.3216	54	34	62	Pass
0.3340	50	33	66	Pass
0.3465	48	30	62	Pass
0.3589	41	29	70	Pass
0.3713	39	25	64	Pass
0.3838	34	24	70	Pass
0.3962	32	23	71	Pass
0.4087	29	20	68	Pass
0.4211	24	20	83	Pass
0.4336	22	19	86	Pass
0.4460	20	18	90	Pass
0.4585	18	17	94	Pass
0.4709	16	16	100	Pass
0.4834	16	15	93	Pass
0.4958	16	15	93	Pass
0.5083	16	13	81	Pass
0.5207	16	12	75	Pass
0.5332	15	11	73	Pass
0.5456	14	11	78	Pass
0.5580	13	11	84	Pass
0.5705	10	10	100	Pass
0.5829	10	9	90	Pass
0.5954	9	8	88	Pass
0.6078	9	8	88	Pass
0.6203	9	8	88	Pass
0.6327	9	8	88	Pass
0.6452	7	5	71	Pass
0.6576	7	5	71	Pass
0.6701	7	5	71	Pass
0.6825	7	5	71	Pass
0.6950	7	5	71	Pass
0.7074	6	5	83	Pass

0.7199	6	5	83	Pass
0.7323	6	5	83	Pass
0.7447	6	4	66	Pass
0.7572	6	4	66	Pass
0.7696	6	4	66	Pass
0.7821	6	4	66	Pass
0.7945	6	4	66	Pass
0.8070	4	4	100	Pass
0.8194	4	2	50	Pass
0.8319	4	2	50	Pass
0.8443	3	2	66	Pass
0.8568	3	2	66	Pass
0.8692	3	2	66	Pass
0.8817	3	2	66	Pass
0.8941	3	2	66	Pass
0.9066	3	2	66	Pass
0.9190	3	2	66	Pass
0.9314	3	1	33	Pass
0.9439	3	1	33	Pass
0.9563	3	1	33	Pass
0.9688	3	1	33	Pass
0.9812	3	1	33	Pass
0.9937	2	1	50	Pass
1.0061	2	1	50	Pass
1.0186	2	1	50	Pass
1.0310	2	0	0	Pass
1.0435	2	0	0	Pass
1.0559	2	0	0	Pass
1.0684	2	0	0	Pass
1.0808	2	0	0	Pass
1.0933	2	0	0	Pass
1.1057	2	0	0	Pass
1.1181	2	0	0	Pass
1.1306	2	0	0	Pass
1.1430	1	0	0	Pass
1.1555	1	0	0	Pass
1.1679	1	0	0	Pass
1.1804	1	0	0	Pass
1.1928	1	0	0	Pass
1.2053	1	0	0	Pass
1.2177	1	0	0	Pass
1.2302	1	0	0	Pass
1.2426	1	0	0	Pass
1.2551	1	0	0	Pass
1.2675	1	0	0	Pass
1.2800	1	0	0	Pass
1.2924	1	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

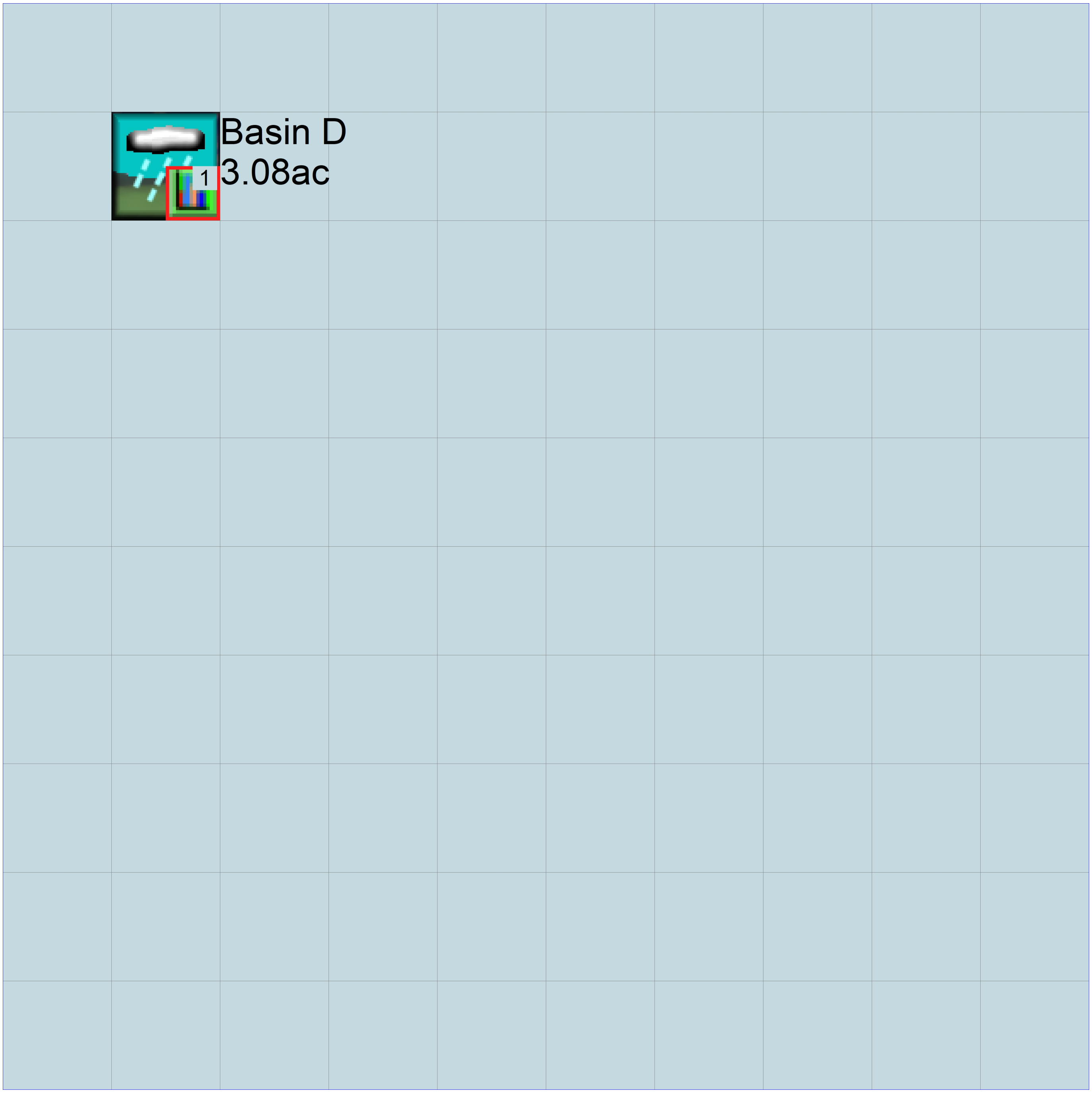
No PERLND changes have been made.

IMPLND Changes

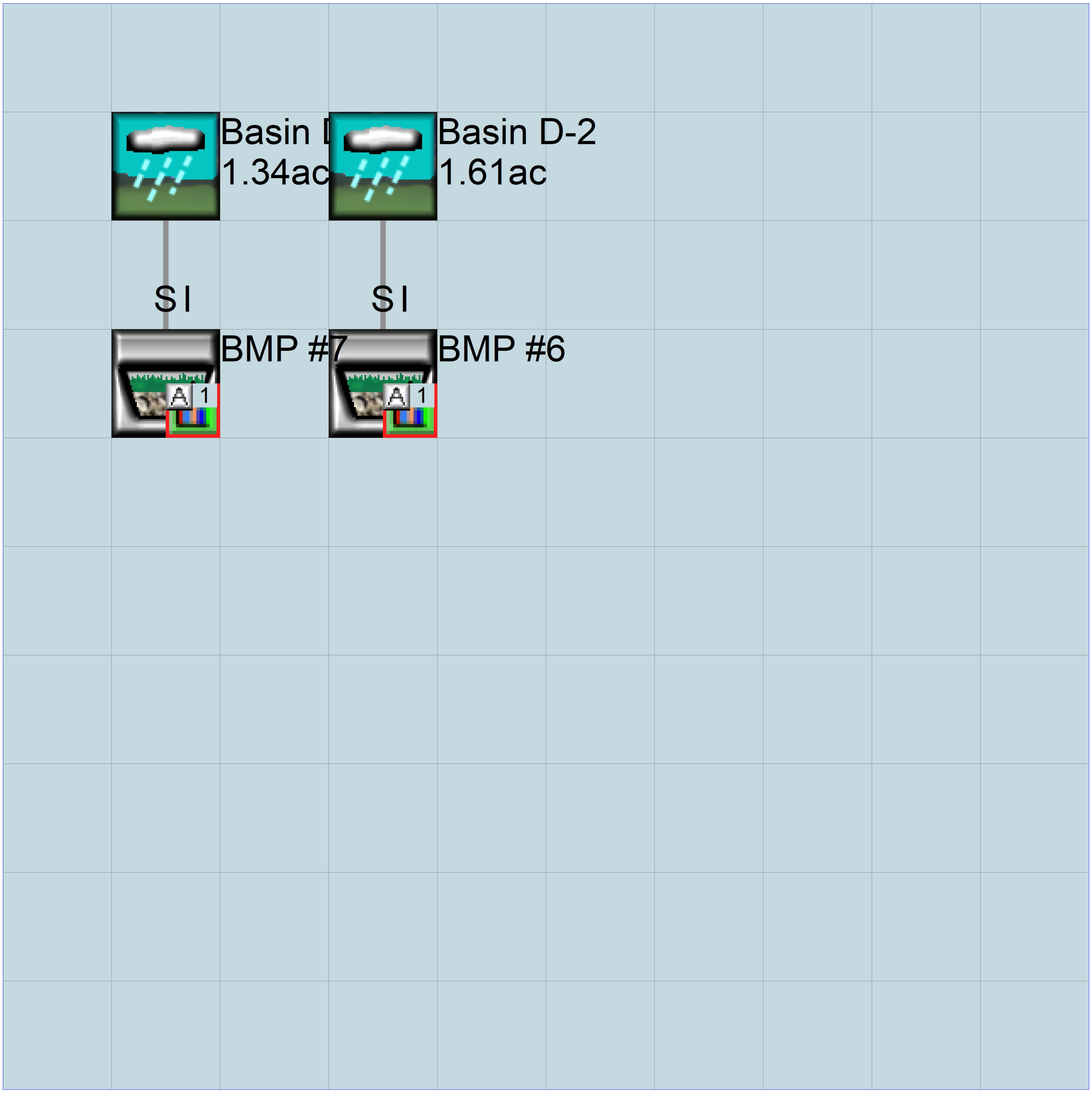
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   POC 4.wdm
MESSU      25   PrePOC 4.MES
           27   PrePOC 4.L61
           28   PrePOC 4.L62
           30   POCPOC 41.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      29
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin D                     MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
   29      D,NatVeg,Moderate      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 ***
   29         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  *********
   29         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 ***
   29         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
   29              0         3     0.025        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   29              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 ***
   29              0       0.6      0.04         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  ***
   29       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  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  ***
   29       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1    0
  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
   29              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 D***
PERLND  29                        3.08     COPY   501     12
PERLND  29                        3.08     COPY   501     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



<-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
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       1971 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   POC 4.wdm
MESSU      25   MitPOC 4.MES
           27   MitPOC 4.L61
           28   MitPOC 4.L62
           30   POCPOC 41.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      47
      IMPLND       1
      PERLND      58
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface BMP #6              MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
    4        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
   47      D,Urban,Moderate       1    1    1    1   27    0
   58      D,UrbNoIrr,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 ***
   47         0    0    1    0    0    0    0    0    0    0    0    0
   58         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  *********
   47         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   58         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 ***
   47         0    1    1    1    0    0    0    0    1    1    0
   58         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
   47              0       3.5     0.025        50       0.1       2.5     0.915
   58              0       3.8      0.03        50      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   47              0         0         2         2         0      0.05      0.05
   58              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 ***
   47              0       0.6      0.03         1       0.3         0
   58              0       0.6      0.03         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   47       0.6  0.6  0.6  0.6  0.7  0.7  0.7  0.7  0.7  0.6  0.6  0.6
   58       0.4  0.4  0.4  0.4  0.7  0.7  0.7  0.7  0.7  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  ***
   47       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1    0
   58       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1    0
  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
   47              0         0      0.15         0         1      0.05         0
   58              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 D-1***
PERLND  47                        0.88     RCHRES   3      2
PERLND  47                        0.88     RCHRES   3      3
IMPLND   1                        0.46     RCHRES   3      5
Basin D-2***
PERLND  47                        1.02     RCHRES   1      2
PERLND  47                        1.02     RCHRES   1      3
PERLND  58                        0.04     RCHRES   1      2
PERLND  58                        0.04     RCHRES   1      3
IMPLND   1                        0.55     RCHRES   1      5

******Routing******
PERLND  47                        0.88     COPY     1     12
IMPLND   1                        0.46     COPY     1     15
PERLND  47                        0.88     COPY     1     13
PERLND  47                        1.02     COPY     1     12
PERLND  58                        0.04     COPY     1     12
IMPLND   1                        0.55     COPY     1     15
PERLND  47                        1.02     COPY     1     13
PERLND  58                        0.04     COPY     1     13
RCHRES   1                           1     RCHRES   2      8
RCHRES   3                           1     RCHRES   4      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
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
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     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 BMP #6          3    1    1    1   28    0    1
    2     BMP #6                  1    1    1    1   28    0    1
    3     Surface BMP #7          3    1    1    1   28    0    1
    4     BMP #7                  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
  END ACTIVITY

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.5       0.0
    2             2      0.01       0.0       0.0       0.5       0.0
    3             3      0.01       0.0       0.0       0.5       0.0
    4             4      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
```

```
    1            0         4.0  5.0  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
  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 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
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  5216.
*** 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            =  945.
*** 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
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   71    4
```

```
    Depth      Area    Volume  Outflow1 Velocity  Travel Time***
     (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
 0.000000  0.069444  0.000000  0.000000
 0.071429  0.069444  0.001488  0.000000
 0.142857  0.069444  0.002976  0.000000
 0.214286  0.069444  0.004464  0.000000
 0.285714  0.069444  0.005952  0.000000
 0.357143  0.069444  0.007440  0.000000
 0.428571  0.069444  0.008929  0.000000
 0.500000  0.069444  0.010417  0.000000
 0.571429  0.069444  0.011905  0.000000
 0.642857  0.069444  0.013393  0.000000
 0.714286  0.069444  0.014881  0.000000
 0.785714  0.069444  0.016369  0.000000
 0.857143  0.069444  0.017857  0.000000
 0.928571  0.069444  0.019345  0.000000
 1.000000  0.069444  0.020833  0.000000
 1.071429  0.069444  0.022321  0.000000
 1.142857  0.069444  0.023810  0.000000
 1.214286  0.069444  0.025298  0.000435
 1.285714  0.069444  0.026786  0.000652
 1.357143  0.069444  0.028274  0.001064
 1.428571  0.069444  0.029762  0.001270
 1.500000  0.069444  0.031250  0.001583
 1.571429  0.069444  0.032738  0.001740
 1.642857  0.069444  0.034226  0.001990
 1.714286  0.069444  0.035714  0.002114
 1.785714  0.069444  0.037202  0.002325
 1.857143  0.069444  0.038690  0.002431
 1.928571  0.069444  0.040179  0.002616
 2.000000  0.069444  0.041667  0.002708
 2.071429  0.069444  0.043725  0.002876
 2.142857  0.069444  0.045784  0.002959
 2.214286  0.069444  0.047842  0.003113
 2.285714  0.069444  0.049901  0.003190
 2.357143  0.069444  0.051959  0.003333
 2.428571  0.069444  0.054018  0.003300
 2.500000  0.069444  0.056076  0.003283
 2.571429  0.069444  0.058135  0.003380
 2.642857  0.069444  0.060193  0.003526
 2.714286  0.069444  0.062252  0.003783
 2.785714  0.069444  0.064311  0.004078
 2.857143  0.069444  0.066369  0.004381
 2.928571  0.069444  0.068428  0.004678
 3.000000  0.069444  0.070486  0.004965
 3.071429  0.069444  0.072545  0.005238
 3.142857  0.069444  0.074603  0.005500
 3.214286  0.069444  0.076662  0.005750
 3.285714  0.069444  0.078720  0.005990
 3.357143  0.069444  0.080779  0.006221
 3.428571  0.069444  0.082837  0.006443
 3.500000  0.069444  0.084896  0.006658
 3.571429  0.069444  0.086954  0.006866
 3.642857  0.069444  0.089013  0.007068
 3.714286  0.069444  0.091071  0.007264
 3.785714  0.069444  0.093130  0.007455
 3.857143  0.069444  0.095188  0.007642
 3.928571  0.069444  0.097247  0.007824
 4.000000  0.069444  0.099306  0.008001
 4.071429  0.069444  0.101364  0.008175
 4.142857  0.069444  0.103423  0.008345
 4.214286  0.069444  0.105481  0.008512
 4.285714  0.069444  0.107540  0.008676
 4.357143  0.069444  0.109598  0.008836
 4.428571  0.069444  0.111657  0.008994
 4.500000  0.069444  0.113715  0.009149
 4.571429  0.069444  0.115774  0.009302
 4.642857  0.069444  0.117832  0.009452
 4.714286  0.069444  0.119891  0.009601
 4.785714  0.069444  0.121949  0.009747
```

```
  4.857143  0.069444  0.124008  0.009891
  4.928571  0.069444  0.126066  0.010035
  5.000000  0.069444  0.269063  0.013627
  END FTABLE  2
  FTABLE      1
   23    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.069444  0.000000  0.000000  0.000000  0.000000
  0.071429  0.070531  0.004999  0.000000  0.362620  0.000000
  0.142857  0.071626  0.010076  0.000000  0.375124  0.000000
  0.214286  0.072729  0.015232  0.000000  0.387628  0.000000
  0.285714  0.073841  0.020466  0.000000  0.400133  0.000000
  0.357143  0.074961  0.025781  0.000000  0.412637  0.000000
  0.428571  0.076090  0.031175  0.000000  0.425141  0.000000
  0.500000  0.077227  0.036651  0.000000  0.437645  0.000000
  0.571429  0.078372  0.042208  0.000000  0.450149  0.000000
  0.642857  0.079526  0.047847  0.000000  0.462653  0.000000
  0.714286  0.080689  0.053569  0.000000  0.475157  0.000000
  0.785714  0.081859  0.059375  0.000000  0.487662  0.000000
  0.857143  0.083039  0.065264  0.000000  0.500166  0.000000
  0.928571  0.084226  0.071238  0.000000  0.512670  0.000000
  1.000000  0.085422  0.077296  0.000000  0.525174  0.000000
  1.071429  0.086627  0.083441  0.303494  0.537678  0.000000
  1.142857  0.087840  0.089672  0.854840  0.550182  0.000000
  1.214286  0.089061  0.095990  1.552922  0.562686  0.000000
  1.285714  0.090291  0.102395  2.338680  0.575191  0.000000
  1.357143  0.091529  0.108889  3.153809  0.587695  0.000000
  1.428571  0.092776  0.115471  3.938950  0.600199  0.000000
  1.500000  0.094031  0.122143  4.639092  0.612703  0.000000
  1.500000  0.094031  0.122143  5.212417  0.612703  0.000000
  END FTABLE  1
  FTABLE      4
   72    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.016070  0.000000  0.000000
  0.056813  0.016070  0.000274  0.000000
  0.113626  0.016070  0.000548  0.000000
  0.170440  0.016070  0.000822  0.000000
  0.227253  0.016070  0.001096  0.000000
  0.284066  0.016070  0.001369  0.000000
  0.340879  0.016070  0.001643  0.000000
  0.397692  0.016070  0.001917  0.000000
  0.454505  0.016070  0.002191  0.000000
  0.511319  0.016070  0.002465  0.000000
  0.568132  0.016070  0.002739  0.000000
  0.624945  0.016070  0.003013  0.000000
  0.681758  0.016070  0.003287  0.000000
  0.738571  0.016070  0.003561  0.000000
  0.795385  0.016070  0.003834  0.000000
  0.852198  0.016070  0.004108  0.000000
  0.909011  0.016070  0.004382  0.000000
  0.965824  0.016070  0.004656  0.000000
  1.022637  0.016070  0.004930  0.000000
  1.079451  0.016070  0.005204  0.000980
  1.136264  0.016070  0.005478  0.001471
  1.193077  0.016070  0.005752  0.002509
  1.249890  0.016070  0.006026  0.003028
  1.306703  0.016070  0.006300  0.003822
  1.363516  0.016070  0.006573  0.004219
  1.420330  0.016070  0.006847  0.004848
  1.477143  0.016070  0.007121  0.005163
  1.533956  0.016070  0.007395  0.005693
  1.590769  0.016070  0.007669  0.005958
  1.647582  0.016070  0.007943  0.006422
  1.704396  0.016070  0.008217  0.006654
  1.761209  0.016070  0.008491  0.007072
```

```
  1.818022  0.016070  0.008765  0.007281
  1.874835  0.016070  0.009038  0.007665
  1.931648  0.016070  0.009312  0.007857
  1.988462  0.016070  0.009586  0.008214
  2.045275  0.016070  0.009965  0.008392
  2.102088  0.016070  0.010344  0.008727
  2.158901  0.016070  0.010723  0.008895
  2.215714  0.016070  0.011102  0.009212
  2.272527  0.016070  0.011481  0.008941
  2.329341  0.016070  0.011860  0.009002
  2.386154  0.016070  0.012238  0.009080
  2.442967  0.016070  0.012617  0.009304
  2.499780  0.016070  0.012996  0.009462
  2.556593  0.016070  0.013375  0.009717
  2.613407  0.016070  0.013754  0.009888
  2.670220  0.016070  0.014133  0.010266
  2.727033  0.016070  0.014512  0.010846
  2.783846  0.016070  0.014891  0.011504
  2.840659  0.016070  0.015270  0.012178
  2.897473  0.016070  0.015648  0.012843
  2.954286  0.016070  0.016027  0.013488
  3.011099  0.016070  0.016406  0.014110
  3.067912  0.016070  0.016785  0.014709
  3.124725  0.016070  0.017164  0.015286
  3.181538  0.016070  0.017543  0.015842
  3.238352  0.016070  0.017922  0.016379
  3.295165  0.016070  0.018301  0.016900
  3.351978  0.016070  0.018679  0.017405
  3.408791  0.016070  0.019058  0.017895
  3.465604  0.016070  0.019437  0.018373
  3.522418  0.016070  0.019816  0.018839
  3.579231  0.016070  0.020195  0.019293
  3.636044  0.016070  0.020574  0.019737
  3.692857  0.016070  0.020953  0.020172
  3.749670  0.016070  0.021332  0.020599
  3.806484  0.016070  0.021711  0.021017
  3.863297  0.016070  0.022089  0.021429
  3.920110  0.016070  0.022468  0.021835
  3.976923  0.016070  0.022847  0.022241
  4.000000  0.016070  0.048302  0.033632
  END FTABLE  4
  FTABLE      3
   22    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.016070  0.000000  0.000000  0.000000  0.000000
  0.056813  0.016698  0.000931  0.000000  0.083320  0.000000
  0.113626  0.017333  0.001898  0.000000  0.085622  0.000000
  0.170440  0.017972  0.002900  0.000000  0.087923  0.000000
  0.227253  0.018617  0.003940  0.000000  0.090224  0.000000
  0.284066  0.019267  0.005016  0.000000  0.092526  0.000000
  0.340879  0.019922  0.006129  0.000000  0.094827  0.000000
  0.397692  0.020583  0.007280  0.000000  0.097129  0.000000
  0.454505  0.021249  0.008468  0.000000  0.099430  0.000000
  0.511319  0.021920  0.009694  0.000000  0.101732  0.000000
  0.568132  0.022597  0.010959  0.000000  0.104033  0.000000
  0.624945  0.023279  0.012262  0.000000  0.106335  0.000000
  0.681758  0.023966  0.013604  0.020305  0.108636  0.000000
  0.738571  0.024659  0.014985  0.285492  0.110938  0.000000
  0.795385  0.025357  0.016406  0.703962  0.113239  0.000000
  0.852198  0.026061  0.017867  1.225066  0.115541  0.000000
  0.909011  0.026769  0.019368  1.817904  0.117842  0.000000
  0.965824  0.027483  0.020909  2.453644  0.120143  0.000000
  1.022637  0.028203  0.022491  3.102664  0.122445  0.000000
  1.079451  0.028928  0.024113  3.734982  0.124746  0.000000
  1.136264  0.029658  0.025778  4.322086  0.127048  0.000000
  1.170000  0.030094  0.026786  4.839637  0.128414  0.000000
  END FTABLE  3
```

```
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM     22 IRRG     ENGL    0.7       SAME PERLND  47     EXTNL  SURLI
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   3     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

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   1002 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1004 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1005 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   1006 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1007 STAG     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1008 STAG     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1009 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

Mitigated HSPF Message File

Disclaimer

Legal Notice

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

Project Name: Beyer Park

Indicate which Items are Included:

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

Project Name: Beyer Park

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

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

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

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: Beyer Park

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

The plans must identify:

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

LEGEND

AC PAVEMENT (SDG-113)	▭
CONC. SIDEWALK	▨
STORM DRAIN UTILITY	——SD——
SUB DRAIN	— SD — — — —
SEWER UTILITY	——S——
WATER UTILITY	——W——
DRAINAGE PATH	→ → → → → → →
CONCRETE HEADWALL	◡
CATCH BASIN	■
MODULAR WETLAND	▨

GRADING QUANTITIES:

GRADED AREA ____________16.2 ACRES

CUT QUANTITIES ___________81,100 CY
FILL QUANTITIES ___________40,800 CY
EXPORT ______________40,300 CY

MAX. CUT DEPTH __21___ [FT]
MAX CUT SLOPE RATIO 2:1
MAX. FILL DEPTH __14___ [FT]
MAX FILL SLOPE RATIO 2:1

THIS PROJECT PROPOSES TO EXPORT 40,300 CUBIC YARDS OF MATERIAL FROM THIS SITE. ALL EXPORT MATERIAL SHALL BE DISCHARGED TO A LEGAL DISPOSAL SITE. THE APPROVAL OF THIS PROJECT DOES NOT ALLOW PROCESSING AND SALE OF THE MATERIAL. ALL SUCH ACTIVITIES REQUIRE A SEPARATE CONDITIONAL USE PERMIT.

AN AS-GRADED GEOTECHNICAL REPORT SHALL BE SUBMITTED TO BOOTH 32 ON THE THIRD FLOOR OF DEVELOPMENT SERVICES WITHIN 15 CALENDAR DAYS OF COMPLETION OF GRADING. AN ADDITIONAL SET SHALL BE PROVIDED TO THE FIELD INSPECTION DIVISION.

EARTHWORK QUANTITIES SHOWN ARE FOR PERMITTING PURPOSES ONLY AND THE CONTRACTOR SHALL NOT USE THESE NUMBERS TO DETERMINE EARTHWORK QUANTITIES.

GRADING NOTES

1. GRADING AS SHOWN ON THESE PLANS SHALL BE IN CONFORMANCE WITH CURRENT STANDARD SPECIFICATIONS AND CHAPTER 14, ARTICLE 2, DIVISION 1, OF THE SAN DIEGO MUNICIPAL CODE.

2. PLANT AND IRRIGATE ALL CUT AND FILL SLOPES AS REQUIRED BY ARTICLE 2, DIVISION 4, SECTION 142.0411 OF THE SAN DIEGO LAND DEVELOPMENT CODE AND ACCORDING TO SECTION IV OR THE LAND DEVELOPMENT MANUAL LANDSCAPE STANDARDS.

3. GRADED, DISTURBED, OR ERODED AREAS THAT WILL NOT BE PERMANENTLY PAVED, COVERED BY STRUCTURE, OR PLANTED FOR A PERIOD OVER 90 DAYS SHALL BE TEMPORARILY RE-VEGETATED WITH A NON-IRRIGATED HYDROSEED MIX, GROUND COVER, OR EQUIVALENT MATERIAL.

CONSTRUCTION NOTES

① SIDEWALK PER SDG-155
② CONCRETE HEADWALL PER D-34
③ SEWER TYPE CLEANOUT PER SC-01
④ STORM WATER TREATMENT AREA PER DETAIL
⑤ MODULAR WETLAND STORMWATER TREATMENT SYSTEM

N

20 0 40 80
SCALE IN FEET
1 inch = 40 ft.

BEYER PARK
SAN DIEGO, CA

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

SCHMIDT DESIGN GROUP, INC.
BALANCING ARTISTIC EXPRESSION IN DESIGN WITH ENVIRONMENTAL SENSITIVITY
1111 Sixth Avenue, Suite 500, San Diego, CA 92101
telephone {619} 236-1462 facsimile {619} 236-8792
www.schmidtdesign.com
Lic. CA 2138, NV 219, AZ 34139

S-00752
WBS #

08/17/2018
DATE

SHEET
OF 6 SHEETS

M:\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\SHEET_DWGS\12820U.1.00 GRAD.DWG (08-20-18 9:12:45AM)

Attachment 5
Drainage Report

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

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

PRELIMINARY DRAINAGE STUDY
for

Beyer Park
San Diego, CA 92173

Project Tracking No.: ….
APN: 6380-70-7100, 6381-70-1800, 6381-70-1900

Prepared By:

BWE
STRUCTURAL ENGINEERING • CIVIL ENGINEERING • SURVEYING • LAND PLANNING

9449 Balboa Avenue, Suite 270
San Diego, CA 92123
Phone: (619) 299-5550
B&W Job #: 12820U.1.00

Date: August 2018

Table of Contents

1. Purpose 2
2. Background 2
3. Existing Condition 2
4. Proposed Improvements 3
5. Soil Characteristics 4
6. Methodology 5
7. Calculations 6
    a. Impervious and Pervious Areas 6
    Table 7-1 Summary of Areas 6
    b. Runoff Coefficient 6
    c. Peak Flow Rates 7
    Table 7-2 Existing and Proposed Conditions Peak Flow Rates Summary 7
    d. Detention & Mitigated Flow Rates 8
8. Downstream Drainage Impact Analysis 8
9. Conclusion 9
10. References 9

Appendices

Site Vicinity Map……………………………………………………... Appendix A
Site Imagery Map

Existing Condition Runoff Coefficient Calculation..…………..……….. Appendix B
Existing Condition Hydrology Calculations
Existing Condition Hydrology Map

Proposed Condition Runoff Coefficient Calculation..………..……….. Appendix C
Proposed Condition Hydrology/Hydraulic Calculations
Proposed Condition Hydrology Map
Hydraulic Analysis…………………………………………………….Appendix D

Excerpts from Drainage Design Manual…………………………………Appendix E
FEMA Flood Plain Map……………………………………………….Appendix F

1. Purpose

The purpose of this drainage study is to analyze the existing and proposed drainage patterns, and peak flow rates for the Beyer Park site in the City of San Diego, California. This study also provides recommendation(s) to manage stormwater runoff in the proposed condition. Project site will be designed to decrease or match the pre-development peak flow rates.

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

2. Background

This project is located in Region number 9, Tijuana Hydrologic Unit, Tijuana Valley Hydrologic Area and San Ysidro Hydrologic Subarea (HSA 911.11) as defined in the Regional Water Quality Control Board's Water Quality Control Plan. The site runoff discharges ultimately into the Pacific Ocean.

The Federal Emergency Management Agency (FEMA) categorizes the project site as Zone X, where Zone X is area determined to be outside 500-year floodplain. Appendix F illustrates the FEMA floodplain mapping within the vicinity of the project site.

Project does not include any activity that would result in the placement of structures or dredge or fill material into Waters of United States. Therefore, the site is not subject to the Regional Water Quality Control Board requirements under the Federal Clean Water Act section 401 or 404.

3. Existing Condition

The proposed Beyer Park site is situated at the intersection of Beyer Blvd and Enright Drive, in the City of San Diego, California. (See Appendix A for Vicinity Map)

The existing 43.613 ac site comprised of a natural terrain with sparse vegetation. Site topography includes moderate to steep slopes with an elevation ranges from 388 to 150 ft from mean sea level. The site runoff generally drains to the west and north. Stormwater runoff from the site including run-on from offsite areas travels across the site via an existing small water courses, gullies and concrete ditches. Portion of the southwesterly area including run-on from easterly portion of the site flows to an existing inlet situated within the terrace ditch prior to discharging offsite. Portion of the northwesterly site area discharges to Filoi Avenue via an existing concrete ditch. The runoff originating from the northerly side of the site surface flows to Delany and Enright Avenues. Runoff from remainder of the northerly site area surface flows directly to Moody Canyon which is situated at the northerly side of the site. Moody Canyon reach situated upstream to the park site is comprised of a natural channel but, the flow is conveyed through an underground storm drain system downstream of this site.

Runoff originating from the site ultimately flows to the Pacific Ocean by way of Tijuana River.

The hydrology of the site area can be generally analyzed and compared at five analysis points as described below:

Discharge Point #1: The runoff originating from majority of the site area (basin A) discharges offsite through discharge point 1. Discharge point 1 is situated at the southwesterly corner of the site. Easterly offsite area also discharges through this point.

Discharge Point #2: The runoff originating from northwesterly area (basin B) discharges offsite through discharge point 2. Discharge point 2 is situated at the northwesterly corner of the site. The runoff discharges to Fioli Avenue via an existing concrete ditch.

Discharge Point #3: The runoff originating from site area (basin C) discharges offsite through discharge point 3. Discharge point 3 is situated at the cul-de-sac at Delany Drive. The runoff discharges to this point via an existing concrete ditch.

Discharge Point #4: The runoff originating from northerly site area (basin D) discharges offsite through discharge point 4. Discharge point 4 is situated at the cul-de-sac at Enright Drive. The runoff surface flows to this point via an existing water course.

Discharge Point #5: The runoff originating from (basin E) discharges offsite through discharge point 5. Discharge point 5 is situated within the existing canyon and adjacent to cul-de-sac at Enright Drive. The runoff surface flows to this point via an existing water course. The runoff then discharges to Moody Canyon through this point.

(See Appendix B for Existing Condition Hydrology Map & Runoff Discharge Points)

4. Proposed Improvements

The major development activities include, but are not limited to, clearing & grubbing, construction of a new picnic area, parking, driveway, walkways, skate park, dog park and landscaping.

The project will also include drainage improvements and construction of Best Management Practices (BMPs). Multiple biofiltration BMPs are proposed to control pollutants, as well as peak flow rates due to the development. These BMPs are proposed because the site must comply with both the requirements for hydromodification and peak flow rate control. Runoff from the site does not discharge to an exempt system.

The on-site drainage pattern has altered slightly to accommodate the proposed development and facilitate the conveyance of the stormwater runoff from the site. The majority of site runoff is directed to the proposed biofiltration BMPs situated strategically throughout the site for quality and quantity control. Additional, control is provided through an underground detention system where mitigation from biofiltration bmps alone is not adequate. Outflow from the proposed BMPs is discharged to an existing conveyance system such as concrete ditch and dirt swales as in the existing condition. The run-on from the existing areas situated easterly side of the site, is bypassed the onsite BMPs. Bypassed flow is routed to the original discharge location to minimize the downstream drainage impacts due to the development. Because the peak flow rate from the site is mitigated in the proposed condition, the development will not create drainage impacts to the existing receiving storm drain system.

In the proposed condition site will have only four discharge points. Existing discharge points 1, 2, 4 and 5 are maintained in the proposed condition. Discharge point 3 is eliminated in the proposed condition due to site constraint.

Basin F is not analyzed. The runoff from this drainage area will be smaller than the existing condition because the area decreased.

(See Appendix C for Proposed Conditions Hydrology Map)

5. Soil Characteristics

Per the City of San Diego Drainage Design Manual Section A.1.2, “Type D” soil is to be used for the site. Therefore, the hydrologic analysis is performed by utilizing soil type D.

6. Methodology

Rational Method: A rational method analysis was utilized to perform hydrologic calculations in this study.

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

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

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

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

7. Calculations

a. Impervious and Pervious Areas

The impervious and pervious areas are calculated for both the existing and proposed site conditions. Areas comparison is made only for the disturbed portion of the site.

Table 7-1 Summary of Areas

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	Impervious (Ai)	Pervious (Ap)		
Existing	16.00	0.16	15.84	1.0%	99.0%
Proposed	16.00	2.72	13.28	17.0%	83.0%
Percentage Change		**1600.0%**	**-16.2%**		

b. Runoff Coefficient

The project site is predominantly in the natural state therefore, runoff coefficient of 0.35 is selected to be used for the existing condition hydrology analysis. This runoff coefficient is equivalent to soil type D with 0% imperviousness per table 3-1 of the County of San Diego hydrology manual. Proposed condition runoff coefficients are determined by utilizing Table A-1 of the City of San Diego Drainage Design Manual by assuming commercial type land use. But, the undisturbed drainage areas are assigned a ‘c’ value of 0.35 in the proposed condition for consistency.

Since the percent impervious in the proposed condition deviates from the standard 80% imperviousness for commercial type land use, the revised C value is calculated by using the following equation provided in Section A.1.2 of the City of San Diego Drainage Design Manual.

The “Revised C” value =

$$\frac{\text{(Actual Percentage of Impervious Area)}}{(80\%)} \times (0.85)$$

In the existing condition, the time of concentration for the initial basin is determined by adding 10 minutes to the calculated time of concentration by assuming natural watershed.

See Appendices B and C respectively for existing and proposed conditions runoff coefficient calculations.

c. Peak Flow Rates

The rational method is used to perform the hydrologic analysis. The software program CivilD, which utilizes the rational method of analysis, is used to determine peak flow rates from the site.

The peak flow rates for the 100 year design storm event are calculated for both existing and proposed condition and the results are summarized in Table 7-2. The detailed calculations/results for existing and proposed conditions analyses are located in Appendices B and C respectively.

Table 7-2 Existing and Proposed Conditions Peak Flow Rates Summary

		Drainage Area (acres)		**100 Yr Flow (cfs)**			**% Change from Existing Condition**
Analysis Point	**Discharge Point**	**Existing Condition**	**Proposed Condition**	**Existing Condition**	**Proposed Condition**	**Mitigated Condition**	
A	**#1**	24.75	26.70	25.00	30.40	23.87	**-4.5**
B	**#2**	5.56	5.00	5.77	9.30	6.43	**11.4**
	#3	0.90	0.00	1.00	0.00	0.00	**-100.0**
Sub-Total		**6.46**	**5.00**	**6.77**	**9.30**	**6.43**	**-5.0**
C	**#4**	1.82	3.12	1.94	5.86	3.19	**64.4**
	#5	4.70	3.24	5.20	3.90	3.90	**-25.0**
Sub-Total		**6.52**	**6.36**	**7.14**	**9.76**	**7.09**	**-0.7**
	#6	1.17	0.84	**Not Analyzed**			
Total		**38.90**	**38.90**	**38.91**	**49.46**	**37.39**	**-3.9**

In the proposed condition, the unmitigated peak flow rate due to the 100 year storm event is anticipated to increase by 10.55 cfs. The increase in peak flow rate in the unmitigated condition is mainly due to the increase in impervious area and runoff coefficient factor.

Proposed storm drain system including detention basin will be designed to convey the peak 100 year flow rate.

See appendix D for details.

d. Detention & Mitigated Flow Rates

The detention basins (biofiltration & underground vault) are designed to control the peak flow rate as well as hydromodification impact due to the redevelopment. Eight detention basins are proposed for this purpose. These basins are located throughout the site as shown in the proposed condition hydrology exhibit.

Peak flow rate mitigation is achieved by routing the flow through multiple detention basins. The hydraflow/hydrograph extension for AutoCAD Civil 3D is utilized for tis purpose. The total 100 year peak flow rate from the site is attenuated from 49.5 cfs to 37.4 cfs. The result of the detention analysis is summarized in the table below. See Appendix D for the results.

	Detention Flow Rate (cfs)			**Approximate Detention Volume Provided (cf)**
	Inflow	**Outflow**	**Detained**	
Detention #1 (BMP #1)	9.42	5.42	4.00	5,339
Detention #2 (BMP #2)	3.50	2.36	1.14	2,054
Detention #3 (BMP #3)	3.90	2.51	1.39	1,036
Detention #4 (BMP #4)	0.79	0.04	0.75	1,070
Detention #5 (BMP #5)	2.75	1.81	0.94	1,470
Detention #6 (BMP #6)	3.10	1.13	1.97	3,178
Detention #7 (BMP #7)	2.02	1.32	0.70	1,470
Detention #8 (BMP #8)	2.12	0.94	1.18	2,940
Total	**27.60**	**15.53**	**12.07**	**18,557**

Approximately, 12.0 cfs is detained through the proposed eight detention basins. Biofiltration basins are analyzed utilizing above ground storage volume only.

8. Downstream Drainage Impact Analysis

The existing onsite drainage pattern has changed but the existing discharge points are maintained to the maximum extent feasible. The runoff from majority of the site area is conveyed offsite through the existing discharge points.

The proposed condition peak flow rates are reduced from the existing condition peak flow rates at each outlet location. Therefore, negative downstream drainage impacts are not anticipated from the development.

9. Conclusion

Storm water runoff from the site is collected and conveyed by a system of swales, inlets, storm drain pipes, and detention basin. The site is designed to mitigate the drainage impacts due to the development. The new storm drain system is designed to convey the runoff from the site. Eight detention basins (7 biofiltration basins and 1 underground vault) are also designed to control the peak flow rate from the site.

The existing onsite drainage pattern needed to be changed slightly in order to accommodate the proposed development. Four existing drainage discharge points are maintained in the proposed condition. The majority of the site runoff is directed to biofiltration basins as opposed to surface flow in the existing condition.

In the proposed condition, the site is designed to reduce the overall 100 year peak flow rate from 38.90 to 37.39 cfs (=1.52 cfs reduction). The capacity of the existing receiving storm drain system will not be impacted due to this development because the peak flow rate is reduced in the proposed condition.

The offsite hydrology and hydraulic analysis of the existing Moody Canyon/Creek and existing culvert is not performed in this study. It is determined that the existing storm drain system is adequately sized to convey the peak flow runoff originating from offsite, as well as onsite tributary drainage areas.

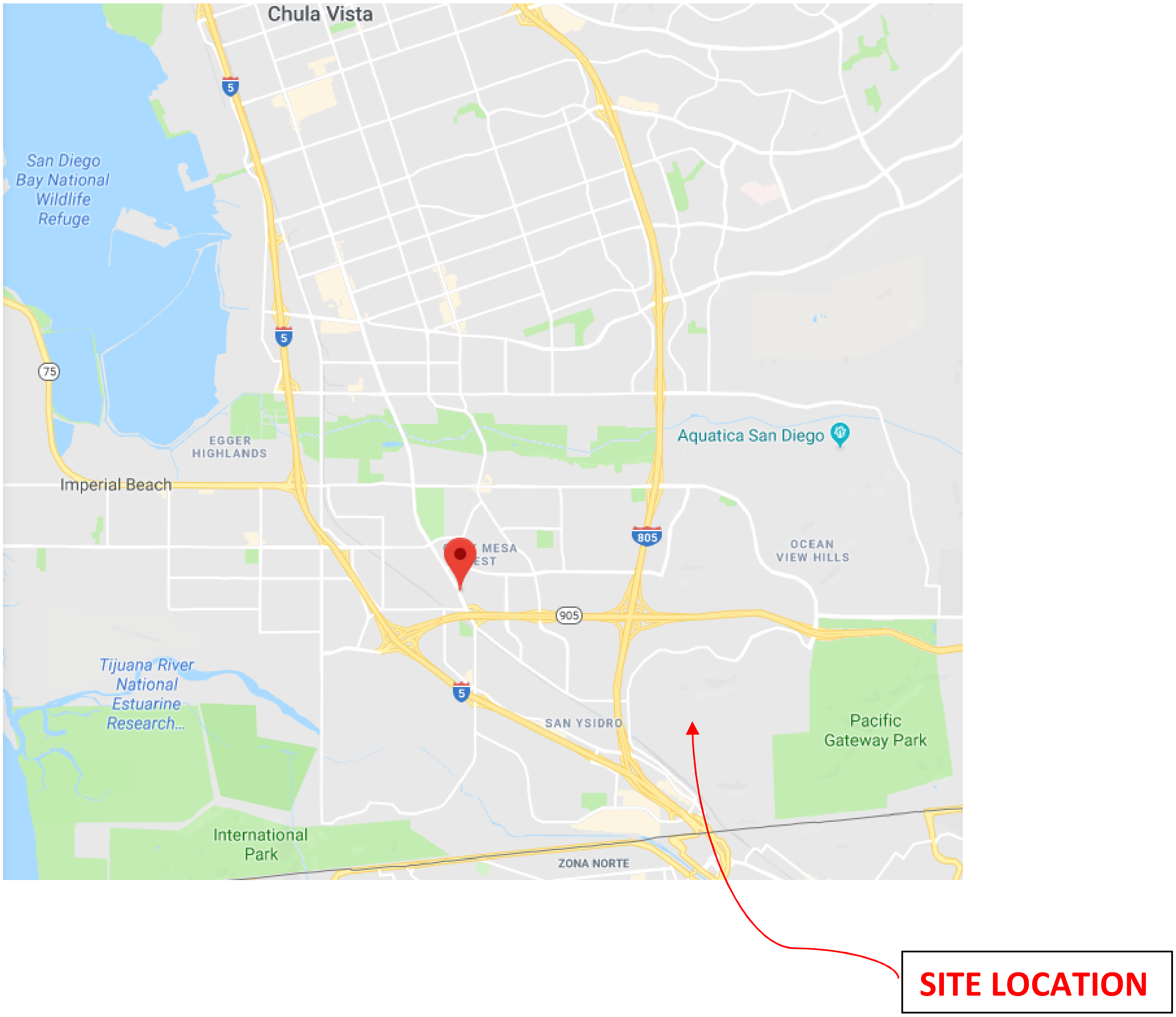
The project should not create any negative impacts to downstream properties.

10. References

- City of San Diego Drainage design Manual, 2017
- County of San Diego Hydrology Manual, 2003
- Project’s Storm Water Quality Management Plan (SWQMP)

APPENDIX A:

Site Vicinity Map
Site Imagery Map



VICINITY MAP


Beyer Blvd
Moody Canyon
Otay Me
Beyer Blvd
Mesa Ave
Delany Dr
805
805
805
E Beyer Blvd
Ave
SDIV Access
Hill St
merica
Center
sidro Blvd
E Beyer Blvd
Taqueria Revolución
San Ysidro Blvd
Border Village
Jacob Dek
Denny's

IMAGERY MAP

APPENDIX B:

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

Runoff Coefficient Calculation (Existing Condition)

Project: Beyer Park

Natural Watershed

Description	Area (Acres)		Actual % Imperviousness	*Use Runoff Coef. (C)
	Area (ac)	Imp. Area (Ai)		
Existing Condition	16.00	0.16	1.00%	0.35

*C value of 0.35 is selected for natural watershed per table 3-1 of County Hydrology Manual

Note: Only the disturbed area is included in the calculation

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/17/18
------------------------------------------------------------------------
EXISTING CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 1_INCLUDING OFFSITE AREA


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  245.000(Ft.)
Highest elevation =  436.200(Ft.)
Lowest elevation =  388.000(Ft.)
Elevation difference =   48.200(Ft.)
TC=[(11.9*0.0464^3)/( 48.20)]^.385=  1.01 + 10 min. =    11.01 min.
```

```
Rainfall intensity (I) =      3.259(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.776(CFS)
Total initial stream area =        0.680(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      101.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    11.01 min.
Rainfall intensity =      3.259(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.342(CFS) for    0.300(Ac.)
Total runoff =      1.118(CFS)  Total area =        0.98(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      3.091(CFS)
Depth of flow =   0.227(Ft.), Average velocity =   3.604(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2              5.00              0.00
        3             10.00              0.30
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      3.091(CFS)
  '     '        flow top width =      7.561(Ft.)
  '     '    velocity=    3.604(Ft/s)
  '     '        area =      0.858(Sq.Ft)
  '     '        Froude number =     1.886

Upstream point elevation =   388.000(Ft.)
Downstream point elevation =   366.000(Ft.)
Flow length =   512.000(Ft.)
Travel time  =    2.37 min.
Time of concentration =   13.38 min.
Depth of flow =   0.227(Ft.)
Average velocity =   3.604(Ft/s)
Total irregular channel flow =     3.091(CFS)
Irregular channel normal depth above invert elev. =   0.227(Ft.)
```

```
Average velocity of channel(s) =   3.604(Ft/s)

Sub-Channel No. 1 Critical depth =      0.293(Ft.)
  '     '       '     Critical flow top width =      9.766(Ft.)
  '     '       '     Critical flow velocity=    2.161(Ft/s)
  '     '       '     Critical flow area =      1.431(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.034(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      3.674(CFS) for    3.460(Ac.)
Total runoff =      4.792(CFS)  Total area =       4.44(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    13.38 min.
Rainfall intensity =      3.034(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.221(CFS) for    1.150(Ac.)
Total runoff =      6.013(CFS)  Total area =       5.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      6.320(CFS)
Depth of flow =   0.240(Ft.), Average velocity =   6.570(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00            0.30
        2             5.00            0.00
        3            10.00            0.30
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      6.320(CFS)
  '     '        flow top width =      8.008(Ft.)
  '     '    velocity=    6.570(Ft/s)
  '     '        area =      0.962(Sq.Ft)
  '     '        Froude number =     3.341
```

```
Upstream point elevation =   373.000(Ft.)
Downstream point elevation =   352.500(Ft.)
Flow length =   155.000(Ft.)
Travel time  =    0.39 min.
Time of concentration =   13.77 min.
Depth of flow =   0.240(Ft.)
Average velocity =   6.570(Ft/s)
Total irregular channel flow =     6.320(CFS)
Irregular channel normal depth above invert elev. =   0.240(Ft.)
Average velocity of channel(s) =   6.570(Ft/s)

Sub-Channel No. 1 Critical depth =      0.383(Ft.)
  '     '       '     Critical flow top width =     10.000(Ft.)
  '     '       '     Critical flow velocity=    2.714(Ft/s)
  '     '       '     Critical flow area =      2.328(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.001(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.599(CFS) for    0.570(Ac.)
Total runoff =      6.612(CFS)  Total area =       6.16(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    13.77 min.
Rainfall intensity =      3.001(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.492(CFS) for    1.420(Ac.)
Total runoff =      8.103(CFS)  Total area =       7.58(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      8.472(CFS)
Depth of flow =   0.487(Ft.), Average velocity =   7.158(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              5.00              0.00
```

```
        3             10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      8.472(CFS)
  '     '        flow top width =      4.865(Ft.)
  '     '    velocity=    7.158(Ft/s)
  '     '        area =      1.184(Sq.Ft)
  '     '        Froude number =     2.558

Upstream point elevation =   352.500(Ft.)
Downstream point elevation =   336.500(Ft.)
Flow length =   255.000(Ft.)
Travel time  =    0.59 min.
Time of concentration =   14.36 min.
Depth of flow =   0.487(Ft.)
Average velocity =   7.158(Ft/s)
Total irregular channel flow =     8.472(CFS)
Irregular channel normal depth above invert elev. =   0.487(Ft.)
Average velocity of channel(s) =   7.158(Ft/s)

Sub-Channel No. 1 Critical depth =      0.711(Ft.)
  '     '       '     Critical flow top width =      7.109(Ft.)
  '     '       '     Critical flow velocity=    3.352(Ft/s)
  '     '       '     Critical flow area =      2.527(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.954(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.713(CFS) for    0.690(Ac.)
Total runoff =      8.817(CFS)  Total area =       8.27(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    14.36 min.
Rainfall intensity =      2.954(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.848(CFS) for    0.820(Ac.)
Total runoff =      9.664(CFS)  Total area =       9.09(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
```

```
Estimated mean flow rate at midpoint of channel =      9.850(CFS)
Depth of flow =   0.458(Ft.), Average velocity =   9.377(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              5.00              0.00
        3             10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      9.851(CFS)
  '     '        flow top width =      4.584(Ft.)
  '     '    velocity=    9.377(Ft/s)
  '     '        area =      1.050(Sq.Ft)
  '     '        Froude number =     3.452

Upstream point elevation =   336.500(Ft.)
Downstream point elevation =   314.000(Ft.)
Flow length =   193.000(Ft.)
Travel time  =    0.34 min.
Time of concentration =   14.71 min.
Depth of flow =   0.458(Ft.)
Average velocity =   9.377(Ft/s)
Total irregular channel flow =     9.850(CFS)
Irregular channel normal depth above invert elev. =   0.458(Ft.)
Average velocity of channel(s) =   9.377(Ft/s)

Sub-Channel No. 1 Critical depth =      0.750(Ft.)
  '     '       '     Critical flow top width =      7.500(Ft.)
  '     '       '     Critical flow velocity=    3.502(Ft/s)
  '     '       '     Critical flow area =      2.813(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.927(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.359(CFS) for    0.350(Ac.)
Total runoff =     10.023(CFS)  Total area =       9.44(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =     11.042(CFS)
Depth of flow =   0.442(Ft.), Average velocity =  11.288(Ft/s)
```

```
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              5.00              0.00
        3             10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     11.042(CFS)
  '     '        flow top width =      4.423(Ft.)
  '     '    velocity=   11.288(Ft/s)
  '     '        area =      0.978(Sq.Ft)
  '     '        Froude number =     4.230

Upstream point elevation =   314.000(Ft.)
Downstream point elevation =   252.000(Ft.)
Flow length =   350.000(Ft.)
Travel time  =    0.52 min.
Time of concentration =   15.22 min.
Depth of flow =   0.442(Ft.)
Average velocity =  11.288(Ft/s)
Total irregular channel flow =    11.042(CFS)
Irregular channel normal depth above invert elev. =   0.442(Ft.)
Average velocity of channel(s) =  11.288(Ft/s)

Sub-Channel No. 1 Critical depth =      0.789(Ft.)
  '     '       '     Critical flow top width =      7.891(Ft.)
  '     '       '     Critical flow velocity=    3.547(Ft/s)
  '     '       '     Critical flow area =      3.113(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.888(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.941(CFS) for    1.920(Ac.)
Total runoff =     11.964(CFS)  Total area =       11.36(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      106.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    15.22 min.
Rainfall intensity =      2.888(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.163(CFS) for    1.150(Ac.)
```

```
Total runoff =     13.127(CFS)  Total area =       12.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     14.087(CFS)
Depth of flow =   0.742(Ft.), Average velocity =  12.786(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              2.00
        2             4.00              0.00
        3             8.00              2.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     14.087(CFS)
  '     '        flow top width =      2.969(Ft.)
  '     '    velocity=   12.786(Ft/s)
  '     '        area =      1.102(Sq.Ft)
  '     '        Froude number =     3.699

Upstream point elevation =   252.000(Ft.)
Downstream point elevation =   231.900(Ft.)
Flow length =   156.000(Ft.)
Travel time  =    0.20 min.
Time of concentration =   15.43 min.
Depth of flow =   0.742(Ft.)
Average velocity =  12.786(Ft/s)
Total irregular channel flow =    14.087(CFS)
Irregular channel normal depth above invert elev. =   0.742(Ft.)
Average velocity of channel(s) =  12.786(Ft/s)

Sub-Channel No. 1 Critical depth =      1.250(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    4.508(Ft/s)
  '     '       '     Critical flow area =      3.125(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.873(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.840(CFS) for    1.830(Ac.)
Total runoff =     14.967(CFS)  Total area =       14.34(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     15.400(CFS)
Depth of flow =   0.652(Ft.), Average velocity =   7.256(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              5.00              0.00
        3             10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     15.400(CFS)
  '     '        flow top width =      6.515(Ft.)
  '     '    velocity=    7.256(Ft/s)
  '     '        area =      2.122(Sq.Ft)
  '     '        Froude number =     2.240

Upstream point elevation =   231.900(Ft.)
Downstream point elevation =   206.000(Ft.)
Flow length =   593.000(Ft.)
Travel time  =    1.36 min.
Time of concentration =   16.79 min.
Depth of flow =   0.652(Ft.)
Average velocity =   7.256(Ft/s)
Total irregular channel flow =    15.400(CFS)
Irregular channel normal depth above invert elev. =   0.652(Ft.)
Average velocity of channel(s) =   7.256(Ft/s)

Sub-Channel No. 1 Critical depth =      0.898(Ft.)
  '     '       '     Critical flow top width =      8.984(Ft.)
  '     '       '     Critical flow velocity=    3.816(Ft/s)
  '     '       '     Critical flow area =      4.036(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.779(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.807(CFS) for    0.830(Ac.)
Total runoff =     15.774(CFS)  Total area =       15.17(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** SUBAREA FLOW ADDITION ****
```

```
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    16.79 min.
Rainfall intensity =      2.779(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      3.015(CFS) for    3.100(Ac.)
Total runoff =     18.789(CFS)  Total area =       18.27(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     19.457(CFS)
Depth of flow =   0.805(Ft.), Average velocity =   6.006(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              1.00
        2             5.00              0.00
        3            10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     19.457(CFS)
  '     '        flow top width =      8.050(Ft.)
  '     '    velocity=    6.006(Ft/s)
  '     '        area =      3.240(Sq.Ft)
  '     '        Froude number =     1.668

Upstream point elevation =   206.000(Ft.)
Downstream point elevation =   200.200(Ft.)
Flow length =   257.000(Ft.)
Travel time  =    0.71 min.
Time of concentration =   17.50 min.
Depth of flow =   0.805(Ft.)
Average velocity =   6.006(Ft/s)
Total irregular channel flow =    19.457(CFS)
Irregular channel normal depth above invert elev. =   0.805(Ft.)
Average velocity of channel(s) =   6.006(Ft/s)

Sub-Channel No. 1 Critical depth =      0.984(Ft.)
  '     '       '     Critical flow top width =      9.844(Ft.)
  '     '       '     Critical flow velocity=    4.016(Ft/s)
  '     '       '     Critical flow area =      4.845(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
```

```
Rainfall intensity =      2.732(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.243(CFS) for    1.300(Ac.)
Total runoff =     20.032(CFS)  Total area =       19.57(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    17.50 min.
Rainfall intensity =      2.732(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      2.237(CFS) for    2.340(Ac.)
Total runoff =     22.269(CFS)  Total area =       21.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     22.493(CFS)
Depth of flow =   0.775(Ft.), Average velocity =   7.490(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              1.00
        2             5.00              0.00
        3            10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     22.493(CFS)
  '     '        flow top width =      7.750(Ft.)
  '     '    velocity=    7.490(Ft/s)
  '     '        area =      3.003(Sq.Ft)
  '     '        Froude number =     2.120

Upstream point elevation =   200.200(Ft.)
Downstream point elevation =   195.400(Ft.)
Flow length =   130.000(Ft.)
Travel time  =    0.29 min.
Time of concentration =   17.79 min.
Depth of flow =   0.775(Ft.)
Average velocity =   7.490(Ft/s)
Total irregular channel flow =    22.493(CFS)
Irregular channel normal depth above invert elev. =   0.775(Ft.)
```

```
Average velocity of channel(s) =   7.490(Ft/s)

Sub-Channel No. 1 Critical depth =      1.039(Ft.)
  '     '       '     Critical flow top width =     10.000(Ft.)
  '     '       '     Critical flow velocity=    4.173(Ft/s)
  '     '       '     Critical flow area =      5.391(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.713(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.418(CFS) for    0.440(Ac.)
Total runoff =     22.687(CFS)  Total area =       22.35(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   190.000(Ft.)
Downstream point/station elevation =   150.000(Ft.)
Pipe length  =   155.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.687(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    22.687(CFS)
Normal flow depth in pipe =    9.18(In.)
Flow top width inside pipe =   14.62(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.86(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    17.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    17.88 min.
Rainfall intensity =      2.708(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      2.274(CFS) for    2.400(Ac.)
Total runoff =     24.961(CFS)  Total area =       24.75(Ac.)
End of computations, total study area =          24.750 (Ac.)
```

```
                            12820EX100YR2

                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/16/18
------------------------------------------------------------------------
EXISTING CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 2


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  108.000(Ft.)
Highest elevation =  253.200(Ft.)
Lowest elevation =  235.000(Ft.)
Elevation difference =   18.200(Ft.)
TC=[(11.9*0.0205^3)/( 18.20)]^.385=  0.57 + 10 min. =    10.57 min.
```

```
Rainfall intensity (I) =      3.307(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.116(CFS)
Total initial stream area =       0.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.463(CFS)
Depth of flow =   0.201(Ft.), Average velocity =   2.861(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             0.50
        2              2.00             0.00
        3              4.00             0.50
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.463(CFS)
  '     '        flow top width =      1.609(Ft.)
  '     '    velocity=    2.861(Ft/s)
  '     '        area =      0.162(Sq.Ft)
  '     '        Froude number =     1.590

Upstream point elevation =   235.000(Ft.)
Downstream point elevation =   225.000(Ft.)
Flow length =   303.000(Ft.)
Travel time  =    1.77 min.
Time of concentration =   12.34 min.
Depth of flow =   0.201(Ft.)
Average velocity =   2.861(Ft/s)
Total irregular channel flow =     0.463(CFS)
Irregular channel normal depth above invert elev. =   0.201(Ft.)
Average velocity of channel(s) =   2.861(Ft/s)

Sub-Channel No. 1 Critical depth =      0.242(Ft.)
  '     '       '     Critical flow top width =      1.938(Ft.)
  '     '       '     Critical flow velocity=    1.973(Ft/s)
  '     '       '     Critical flow area =      0.235(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.126(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.657(CFS) for    0.600(Ac.)
```

```
Total runoff =      0.772(CFS)  Total area =       0.70(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    12.34 min.
Rainfall intensity =      3.126(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.711(CFS) for    0.650(Ac.)
Total runoff =      1.484(CFS)  Total area =       1.35(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.769(CFS)
Depth of flow =   0.200(Ft.), Average velocity =   3.534(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.20
        2              2.50              0.00
        3              5.00              0.20
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      1.769(CFS)
  '     '        flow top width =      5.000(Ft.)
  '     '    velocity=    3.535(Ft/s)
  '     '        area =      0.501(Sq.Ft)
  '     '        Froude number =     1.969

Upstream point elevation =   225.000(Ft.)
Downstream point elevation =   209.600(Ft.)
Flow length =   315.000(Ft.)
Travel time  =    1.49 min.
Time of concentration =   13.82 min.
Depth of flow =   0.200(Ft.)
Average velocity =   3.534(Ft/s)
Total irregular channel flow =     1.769(CFS)
Irregular channel normal depth above invert elev. =   0.200(Ft.)
Average velocity of channel(s) =   3.534(Ft/s)
!!Warning: Water is above left or right bank elevations
```

```
Sub-Channel No. 1 Critical depth =      0.258(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    2.242(Ft/s)
  '     '       '     Critical flow area =      0.789(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.997(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.545(CFS) for    0.520(Ac.)
Total runoff =      2.029(CFS)  Total area =        1.87(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.245(Ft.), Average velocity =   4.073(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              0.30
        2             2.50              0.00
        3             5.00              0.30
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      2.029(CFS)
  '     '        flow top width =      4.075(Ft.)
  '     '    velocity=    4.073(Ft/s)
  '     '        area =      0.498(Sq.Ft)
  '     '        Froude number =     2.053

Upstream point elevation =   209.600(Ft.)
Downstream point elevation =   205.000(Ft.)
Flow length =    92.000(Ft.)
Travel time  =    0.38 min.
Time of concentration =   14.20 min.
Depth of flow =   0.245(Ft.)
Average velocity =   4.073(Ft/s)
Total irregular channel flow =     2.029(CFS)
Irregular channel normal depth above invert elev. =   0.245(Ft.)
Average velocity of channel(s) =   4.073(Ft/s)

Sub-Channel No. 1 Critical depth =      0.322(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    2.356(Ft/s)
```

```
  '     '       '     Critical flow area =      0.861(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.551(Ft.), Average velocity =   6.682(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.00              0.00
        3              2.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      2.029(CFS)
  '     '        flow top width =      1.102(Ft.)
  '     '    velocity=    6.682(Ft/s)
  '     '        area =      0.304(Sq.Ft)
  '     '        Froude number =     2.243

Upstream point elevation =   204.500(Ft.)
Downstream point elevation =   202.500(Ft.)
Flow length =    57.000(Ft.)
Travel time  =    0.14 min.
Time of concentration =   14.34 min.
Depth of flow =   0.551(Ft.)
Average velocity =   6.682(Ft/s)
Total irregular channel flow =     2.029(CFS)
Irregular channel normal depth above invert elev. =   0.551(Ft.)
Average velocity of channel(s) =   6.682(Ft/s)

Sub-Channel No. 1 Critical depth =      0.762(Ft.)
  '     '       '     Critical flow top width =      1.523(Ft.)
  '     '       '     Critical flow velocity=    3.497(Ft/s)
  '     '       '     Critical flow area =      0.580(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.164(Ft.), Average velocity =   4.546(Ft/s)
        ******* Irregular Channel Data ***********
```

```
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2              5.00              0.00
        3             10.00              0.30
Manning's 'N' friction factor =   0.020
----------------------------------------------------------------
Sub-Channel flow  =      2.029(CFS)
  '     '        flow top width =      5.455(Ft.)
  '     '    velocity=    4.546(Ft/s)
  '     '        area =      0.446(Sq.Ft)
  '     '        Froude number =     2.801

Upstream point elevation =   202.500(Ft.)
Downstream point elevation =   195.000(Ft.)
Flow length =    71.000(Ft.)
Travel time  =    0.26 min.
Time of concentration =   14.60 min.
Depth of flow =   0.164(Ft.)
Average velocity =   4.546(Ft/s)
Total irregular channel flow =     2.029(CFS)
Irregular channel normal depth above invert elev. =   0.164(Ft.)
Average velocity of channel(s) =   4.546(Ft/s)

Sub-Channel No. 1 Critical depth =      0.246(Ft.)
  '     '       '     Critical flow top width =      8.203(Ft.)
  '     '       '     Critical flow velocity=    2.010(Ft/s)
  '     '       '     Critical flow area =      1.009(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.756(CFS)
Depth of flow =   0.484(Ft.), Average velocity =   7.845(Ft/s)
        ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.50              0.00
        3              3.00              1.00
Manning's 'N' friction factor =   0.014
----------------------------------------------------------------
Sub-Channel flow  =      2.756(CFS)
```

```
  '     '        flow top width =      1.452(Ft.)
  '     '    velocity=    7.845(Ft/s)
  '     '        area =      0.351(Sq.Ft)
  '     '        Froude number =     2.811

Upstream point elevation =   194.000(Ft.)
Downstream point elevation =   186.500(Ft.)
Flow length =   162.000(Ft.)
Travel time  =    0.34 min.
Time of concentration =   14.94 min.
Depth of flow =   0.484(Ft.)
Average velocity =   7.845(Ft/s)
Total irregular channel flow =     2.756(CFS)
Irregular channel normal depth above invert elev. =   0.484(Ft.)
Average velocity of channel(s) =   7.845(Ft/s)

Sub-Channel No. 1 Critical depth =      0.734(Ft.)
  '     '       '     Critical flow top width =      2.203(Ft.)
  '     '       '     Critical flow velocity=    3.407(Ft/s)
  '     '       '     Critical flow area =      0.809(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.909(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.364(CFS) for    1.340(Ac.)
Total runoff =      3.393(CFS)  Total area =        3.21(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      208.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_______________________________________________________________________
Depth of flow =   0.205(Ft.), Average velocity =   4.868(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2              5.00              0.00
        3             10.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      3.393(CFS)
  '     '        flow top width =      6.817(Ft.)
  '     '    velocity=    4.868(Ft/s)
  '     '        area =      0.697(Sq.Ft)
  '     '        Froude number =     2.683
```

```
Upstream point elevation =   186.500(Ft.)
Downstream point elevation =   182.000(Ft.)
Flow length =    50.000(Ft.)
Travel time  =    0.17 min.
Time of concentration =   15.12 min.
Depth of flow =   0.205(Ft.)
Average velocity =   4.868(Ft/s)
Total irregular channel flow =     3.393(CFS)
Irregular channel normal depth above invert elev. =   0.205(Ft.)
Average velocity of channel(s) =   4.868(Ft/s)

Sub-Channel No. 1 Critical depth =      0.303(Ft.)
  '     '       '     Critical flow top width =     10.000(Ft.)
  '     '       '     Critical flow velocity=    2.222(Ft/s)
  '     '       '     Critical flow area =      1.527(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      209.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      3.906(CFS)
Depth of flow =   0.492(Ft.), Average velocity =  10.746(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.50              0.00
        3              3.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      3.906(CFS)
  '     '        flow top width =      1.477(Ft.)
  '     '    velocity=   10.746(Ft/s)
  '     '        area =      0.363(Sq.Ft)
  '     '        Froude number =     3.817

Upstream point elevation =   182.000(Ft.)
Downstream point elevation =   177.500(Ft.)
Flow length =    53.000(Ft.)
Travel time  =    0.08 min.
Time of concentration =   15.20 min.
Depth of flow =   0.492(Ft.)
Average velocity =  10.746(Ft/s)
Total irregular channel flow =     3.906(CFS)
```

```
Irregular channel normal depth above invert elev. =   0.492(Ft.)
Average velocity of channel(s) =  10.746(Ft/s)

Sub-Channel No. 1 Critical depth =      0.844(Ft.)
  '     '       '     Critical flow top width =      2.531(Ft.)
  '     '       '     Critical flow velocity=    3.658(Ft/s)
  '     '       '     Critical flow area =      1.068(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.890(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.981(CFS) for    0.970(Ac.)
Total runoff =      4.375(CFS)  Total area =       4.18(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      209.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    15.20 min.
Rainfall intensity =      2.890(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.526(CFS) for    0.520(Ac.)
Total runoff =      4.901(CFS)  Total area =       4.70(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      5.041(CFS)
Depth of flow =   0.501(Ft.), Average velocity =  13.398(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.50              0.00
        3              3.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      5.041(CFS)
  '     '        flow top width =      1.503(Ft.)
  '     '    velocity=   13.398(Ft/s)
  '     '        area =      0.376(Sq.Ft)
  '     '        Froude number =     4.718
```

```
Upstream point elevation =   177.500(Ft.)
Downstream point elevation =   150.800(Ft.)
Flow length =   207.000(Ft.)
Travel time  =    0.26 min.
Time of concentration =   15.45 min.
Depth of flow =   0.501(Ft.)
Average velocity =  13.398(Ft/s)
Total irregular channel flow =     5.041(CFS)
Irregular channel normal depth above invert elev. =   0.501(Ft.)
Average velocity of channel(s) =  13.398(Ft/s)

Sub-Channel No. 1 Critical depth =      0.930(Ft.)
  '     '       '     Critical flow top width =      2.789(Ft.)
  '     '       '     Critical flow velocity=    3.889(Ft/s)
  '     '       '     Critical flow area =      1.296(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.871(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.271(CFS) for    0.270(Ac.)
Total runoff =      5.172(CFS)  Total area =       4.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      210.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    15.45 min.
Rainfall intensity =      2.871(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.593(CFS) for    0.590(Ac.)
Total runoff =      5.765(CFS)  Total area =       5.56(Ac.)
End of computations, total study area =          5.560 (Ac.)
```

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/17/18
------------------------------------------------------------------------
EXISTING CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 3


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  160.000(Ft.)
Highest elevation =  225.200(Ft.)
Lowest elevation =  213.000(Ft.)
Elevation difference =   12.200(Ft.)
TC=[(11.9*0.0303^3)/( 12.20)]^.385=  1.05 + 10 min. =    11.05 min.
```

```
Rainfall intensity (I) =      3.255(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.319(CFS)
Total initial stream area =       0.280(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.121(Ft.), Average velocity =  14.535(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.50              0.00
        3              3.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      0.319(CFS)
  '     '        flow top width =      0.363(Ft.)
  '     '    velocity=   14.535(Ft/s)
  '     '        area =      0.022(Sq.Ft)
  '     '        Froude number =    10.416

Upstream point elevation =   213.000(Ft.)
Downstream point elevation =   106.000(Ft.)
Flow length =   106.000(Ft.)
Travel time  =    0.12 min.
Time of concentration =   11.17 min.
Depth of flow =   0.121(Ft.)
Average velocity =  14.535(Ft/s)
Total irregular channel flow =     0.319(CFS)
Irregular channel normal depth above invert elev. =   0.121(Ft.)
Average velocity of channel(s) =  14.535(Ft/s)

Sub-Channel No. 1 Critical depth =      0.309(Ft.)
  '     '       '     Critical flow top width =      0.926(Ft.)
  '     '       '     Critical flow velocity=    2.233(Ft/s)
  '     '       '     Critical flow area =      0.143(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
```

```
User specified 'C' value of 0.350 given for subarea
Time of concentration =    11.17 min.
Rainfall intensity =      3.242(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.374(CFS) for    0.330(Ac.)
Total runoff =      0.693(CFS)  Total area =        0.61(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    11.17 min.
Rainfall intensity =      3.242(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.329(CFS) for    0.290(Ac.)
Total runoff =      1.022(CFS)  Total area =        0.90(Ac.)
End of computations, total study area =           0.900 (Ac.)
```

```
              San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/17/18
------------------------------------------------------------------------
EXISTING CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 4


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  152.000(Ft.)
Highest elevation =  257.000(Ft.)
Lowest elevation =  251.000(Ft.)
Elevation difference =    6.000(Ft.)
TC=[(11.9*0.0288^3)/(  6.00)]^.385=  1.30 + 10 min. =    11.30 min.
```

```
Rainfall intensity (I) =      3.228(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.158(CFS)
Total initial stream area =       0.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.254(CFS)
Depth of flow =   0.082(Ft.), Average velocity =   3.754(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              5.00              0.00
        3             10.00              0.50
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.254(CFS)
  '     '        flow top width =      1.646(Ft.)
  '     '    velocity=    3.754(Ft/s)
  '     '        area =      0.068(Sq.Ft)
  '     '        Froude number =     3.262

Upstream point elevation =   251.000(Ft.)
Downstream point elevation =   232.000(Ft.)
Flow length =   105.000(Ft.)
Travel time  =    0.47 min.
Time of concentration =   11.76 min.
Depth of flow =   0.082(Ft.)
Average velocity =   3.754(Ft/s)
Total irregular channel flow =     0.254(CFS)
Irregular channel normal depth above invert elev. =   0.082(Ft.)
Average velocity of channel(s) =   3.754(Ft/s)

Sub-Channel No. 1 Critical depth =      0.132(Ft.)
  '     '       '     Critical flow top width =      2.637(Ft.)
  '     '       '     Critical flow velocity=    1.463(Ft/s)
  '     '       '     Critical flow area =      0.174(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.181(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.189(CFS) for    0.170(Ac.)
```

```
Total runoff =      0.347(CFS)  Total area =        0.31(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.796(CFS)
Depth of flow =   0.283(Ft.), Average velocity =   3.319(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              1.00
        2             3.00              0.00
        3             6.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.796(CFS)
  '     '        flow top width =      1.696(Ft.)
  '     '    velocity=    3.319(Ft/s)
  '     '        area =      0.240(Sq.Ft)
  '     '        Froude number =     1.555

Upstream point elevation =   232.000(Ft.)
Downstream point elevation =   222.700(Ft.)
Flow length =   320.000(Ft.)
Travel time  =    1.61 min.
Time of concentration =   13.37 min.
Depth of flow =   0.283(Ft.)
Average velocity =   3.319(Ft/s)
Total irregular channel flow =     0.796(CFS)
Irregular channel normal depth above invert elev. =   0.283(Ft.)
Average velocity of channel(s) =   3.319(Ft/s)

Sub-Channel No. 1 Critical depth =      0.338(Ft.)
  '     '       '     Critical flow top width =      2.027(Ft.)
  '     '       '     Critical flow velocity=    2.323(Ft/s)
  '     '       '     Critical flow area =      0.343(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.035(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.850(CFS) for    0.800(Ac.)
Total runoff =      1.197(CFS)  Total area =        1.11(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.332(CFS)
Depth of flow =   0.269(Ft.), Average velocity =   3.674(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              2.50              0.00
        3              5.00              0.50
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      1.332(CFS)
  '     '        flow top width =      2.693(Ft.)
  '     '    velocity=    3.674(Ft/s)
  '     '        area =      0.363(Sq.Ft)
  '     '        Froude number =     1.764

Upstream point elevation =   222.700(Ft.)
Downstream point elevation =   215.500(Ft.)
Flow length =   198.000(Ft.)
Travel time  =    0.90 min.
Time of concentration =   14.27 min.
Depth of flow =   0.269(Ft.)
Average velocity =   3.674(Ft/s)
Total irregular channel flow =     1.332(CFS)
Irregular channel normal depth above invert elev. =   0.269(Ft.)
Average velocity of channel(s) =   3.674(Ft/s)

Sub-Channel No. 1 Critical depth =      0.338(Ft.)
  '     '       '     Critical flow top width =      3.379(Ft.)
  '     '       '     Critical flow velocity=    2.333(Ft/s)
  '     '       '     Critical flow area =      0.571(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.961(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.259(CFS) for    0.250(Ac.)
Total runoff =      1.456(CFS)  Total area =       1.36(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      404.000
**** SUBAREA FLOW ADDITION ****
```

```
User specified 'C' value of 0.350 given for subarea
Time of concentration =    14.27 min.
Rainfall intensity =      2.961(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.477(CFS) for    0.460(Ac.)
Total runoff =      1.933(CFS)  Total area =        1.82(Ac.)
End of computations, total study area =           1.820 (Ac.)
```

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/20/18
------------------------------------------------------------------------
EXISTING CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 5


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =   74.000(Ft.)
Highest elevation =  347.500(Ft.)
Lowest elevation =  337.000(Ft.)
Elevation difference =   10.500(Ft.)
TC=[(11.9*0.0140^3)/( 10.50)]^.385=  0.46 + 10 min. =    10.46 min.
```

```
Rainfall intensity (I) =      3.320(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.139(CFS)
Total initial stream area =       0.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.488(CFS)
Depth of flow =   0.105(Ft.), Average velocity =   4.419(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             0.50
        2              5.00             0.00
        3             10.00             0.50
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.488(CFS)
  '     '        flow top width =      2.102(Ft.)
  '     '    velocity=    4.419(Ft/s)
  '     '        area =      0.110(Sq.Ft)
  '     '        Froude number =     3.397

Upstream point elevation =   337.000(Ft.)
Downstream point elevation =   284.000(Ft.)
Flow length =   293.000(Ft.)
Travel time  =    1.11 min.
Time of concentration =   11.56 min.
Depth of flow =   0.105(Ft.)
Average velocity =   4.419(Ft/s)
Total irregular channel flow =     0.488(CFS)
Irregular channel normal depth above invert elev. =   0.105(Ft.)
Average velocity of channel(s) =   4.419(Ft/s)

Sub-Channel No. 1 Critical depth =      0.172(Ft.)
  '     '       '     Critical flow top width =      3.438(Ft.)
  '     '       '     Critical flow velocity=    1.652(Ft/s)
  '     '       '     Critical flow area =      0.295(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.201(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.672(CFS) for    0.600(Ac.)
```

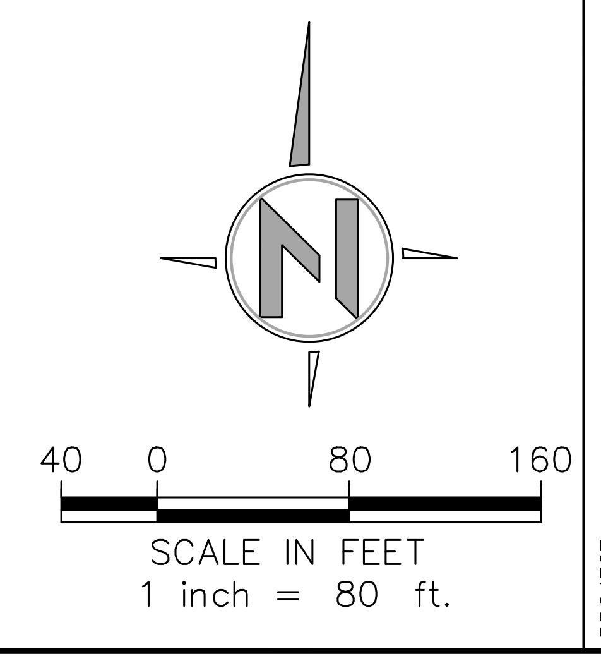
```
Total runoff =      0.812(CFS)  Total area =        0.72(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.330(CFS)
Depth of flow =   0.390(Ft.), Average velocity =   8.749(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              2.00
        2              2.00              0.00
        3              4.00              2.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      1.330(CFS)
  '     '        flow top width =      0.780(Ft.)
  '     '    velocity=    8.749(Ft/s)
  '     '        area =      0.152(Sq.Ft)
  '     '        Froude number =     3.492

Upstream point elevation =   284.000(Ft.)
Downstream point elevation =   225.200(Ft.)
Flow length =   302.000(Ft.)
Travel time  =    0.58 min.
Time of concentration =   12.14 min.
Depth of flow =   0.390(Ft.)
Average velocity =   8.749(Ft/s)
Total irregular channel flow =     1.330(CFS)
Irregular channel normal depth above invert elev. =   0.390(Ft.)
Average velocity of channel(s) =   8.749(Ft/s)

Sub-Channel No. 1 Critical depth =      0.641(Ft.)
  '     '       '     Critical flow top width =      1.281(Ft.)
  '     '       '     Critical flow velocity=    3.242(Ft/s)
  '     '       '     Critical flow area =      0.410(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.145(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.013(CFS) for    0.920(Ac.)
Total runoff =      1.824(CFS)  Total area =        1.64(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.447(CFS)
Depth of flow =   0.353(Ft.), Average velocity =   6.556(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              3.00              0.00
        3              6.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      2.448(CFS)
  '     '        flow top width =      2.117(Ft.)
  '     '    velocity=    6.556(Ft/s)
  '     '        area =      0.373(Sq.Ft)
  '     '        Froude number =     2.751

Upstream point elevation =   253.500(Ft.)
Downstream point elevation =   228.000(Ft.)
Flow length =   302.000(Ft.)
Travel time  =    0.77 min.
Time of concentration =   12.90 min.
Depth of flow =   0.353(Ft.)
Average velocity =   6.556(Ft/s)
Total irregular channel flow =     2.447(CFS)
Irregular channel normal depth above invert elev. =   0.353(Ft.)
Average velocity of channel(s) =   6.556(Ft/s)

Sub-Channel No. 1 Critical depth =      0.527(Ft.)
  '     '       '     Critical flow top width =      3.164(Ft.)
  '     '       '     Critical flow velocity=    2.934(Ft/s)
  '     '       '     Critical flow area =      0.834(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.075(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.205(CFS) for    1.120(Ac.)
Total runoff =      3.030(CFS)  Total area =       2.76(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      504.000
**** SUBAREA FLOW ADDITION ****
```

```
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    12.90 min.
Rainfall intensity =      3.075(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.947(CFS) for    0.880(Ac.)
Total runoff =      3.977(CFS)  Total area =       3.64(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      504.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    12.90 min.
Rainfall intensity =      3.075(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.141(CFS) for    1.060(Ac.)
Total runoff =      5.118(CFS)  Total area =       4.70(Ac.)
End of computations, total study area =          4.700 (Ac.)
```

LEGEND

LEGEND	SYMBOL
OUTER BASIN BOUNDARY	▬▬▬
MAJOR BASIN BOUNDARY	▬ ▪ ▬
MINOR BASIN BOUNDARY	▪▪▪▪▪▪▪
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	→
FLOW PATH	→ → → → →
FLOW LENGTH	L=XX.X'
NODE ELEVATION	313.00FL 310.00IE
HYDROLOGY NODE	200
ANALYSIS/EXIT POINT	1
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX



SCALE IN FEET
1 inch = 80 ft.

BWE
619.299.5550
WWW.BWESD.COM

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE:
DRAWN BY:
CHECKED BY:
BWE JOB NUMBER:
CLIENT JOB NUMBER:
MUNICIPALITY PROJECT NUMBER:

SHEET TITLE

EXISTING CONDITION HYDROLOGY EXHIBIT

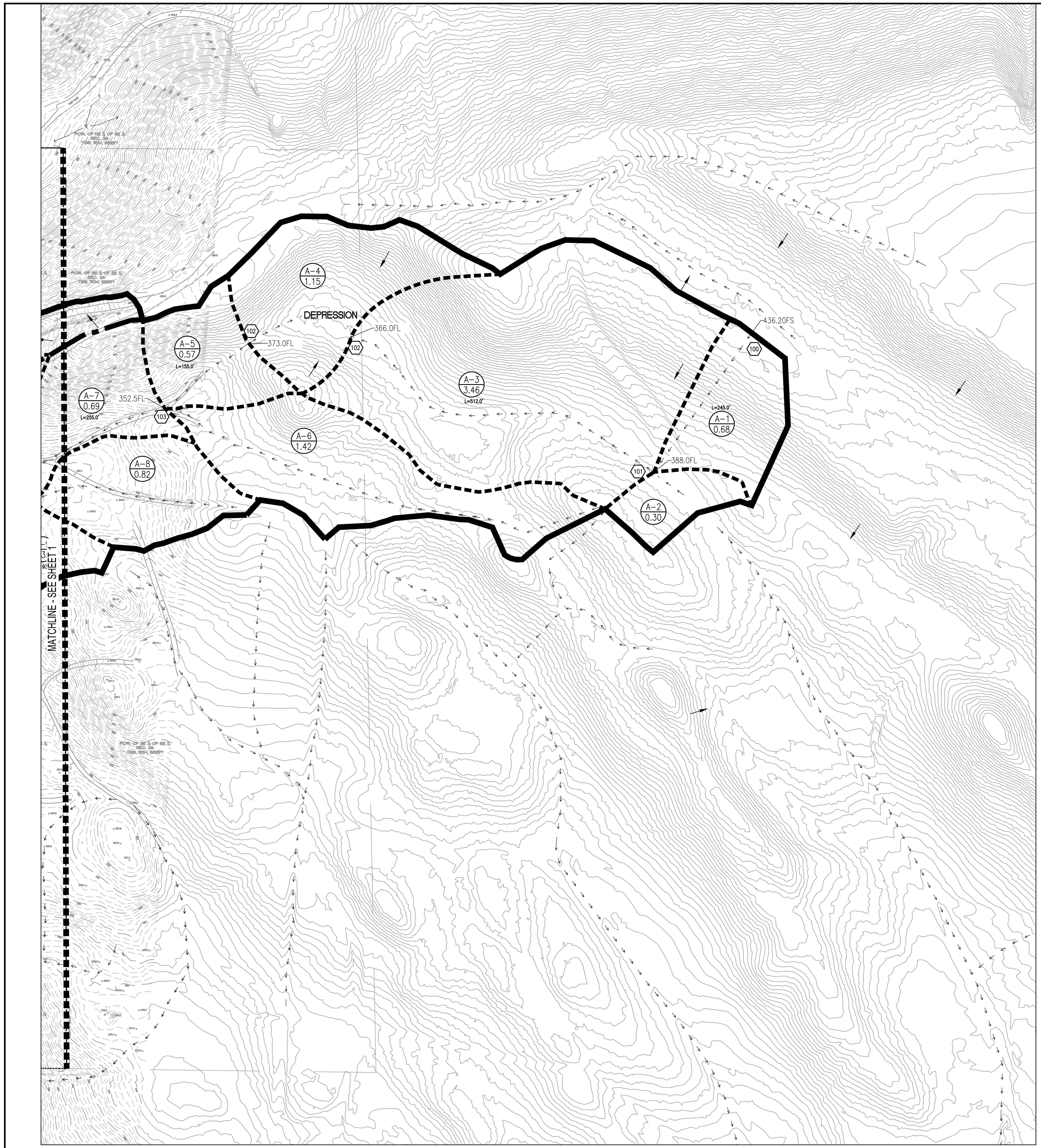
SHEET 1 OF 2

PROJECT

ESCAYA PARK
CHULA VISTA, CA

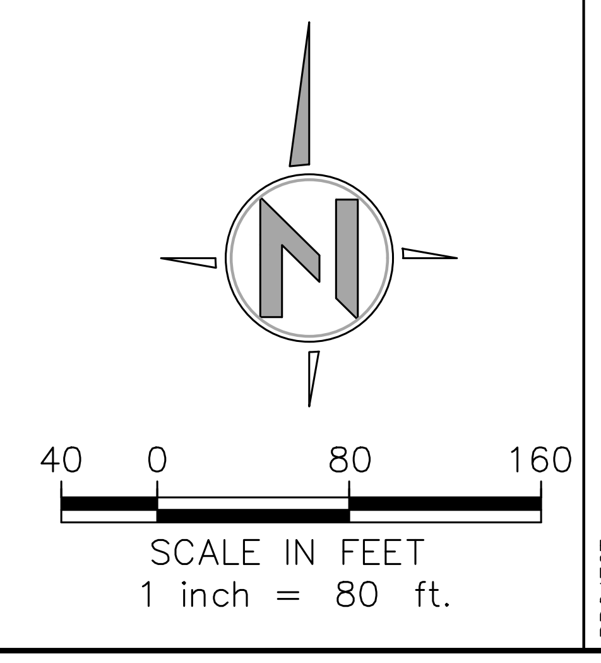
SITE ADDRESS

PLOT: \\BWE-FIVE\CAD\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\EXHIBITS\DRAINAGE\12820U.1.00 EXIST-HYDRO.DWG Min GC 8/21/2018 2:07 PM



LEGEND

LEGEND	SYMBOL
OUTER BASIN BOUNDARY	▬▬▬
MAJOR BASIN BOUNDARY	▬ ■ ▬
MINOR BASIN BOUNDARY	■ ■ ■ ■
EXISTING STORM DRAIN	—SD—
EXISTING CONTOUR	– – —XXX— – –
FLOW DIRECTION	→
FLOW PATH	→ → → → →
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	313.00FL 310.00IE
HYDROLOGY NODE	⬡ 200
ANALYSIS/EXIT POINT	△ 1
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX



SCALE IN FEET
1 inch = 80 ft.

619.299.5550
WWW.BWESD.COM

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE:
DRAWN BY:
CHECKED BY:
BWE JOB NUMBER:
CLIENT JOB NUMBER:
MUNICIPALITY PROJECT NUMBER:

SHEET TITLE

EXISTING CONDITION HYDROLOGY EXHIBIT

SHEET 2 OF 2

PROJECT

ESCAYA PARK
CHULA VISTA, CA

SITE ADDRESS

PLOT: \\BWE-FIVE\CAD\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\EXHIBITS\DRAINAGE\12820U.1.00 EXIST-HYDRO.DWG Min GC 8/21/2018 2:09 PM

APPENDIX C:

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

Runoff Coefficient Calculation for (Proposed Condition)

Project: Beyer Park

Similar to commercial development

C = 0.85 (Per Table A-1, Soil Class D, Drainage Design Manual)

% imperviousness= 80% (Tabulated Imperviousness per Table A-1)

Revised C= (Actual % Imp./Tabulated % Imp.)*0.85

Description	Area (Acres)		Actual % Imperviousness	Revised Runoff Coef. (C)	*Use Runoff Coef. (C)
	Total Area	Imp. Area (Ai)			
Proposed Condition	16.00	2.72	17.00%	0.18	0.50

*C value for commercial development shall not be less than = 0.5

Note: Only the disturbed area is included in the calculation

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/20/18
------------------------------------------------------------------------
PROPOSED CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 1_INCLUDING OFFSITE AREA


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Rainfall intensity (I) =      2.875(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  15.40 min.  Rain intensity =       2.88(In/Hr)
Total area =       14.320(Ac.)  Total runoff =    14.400(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
```

```
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     14.817(CFS)
Depth of flow =   0.644(Ft.), Average velocity =   7.149(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              5.00              0.00
        3             10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     14.817(CFS)
  '     '        flow top width =      6.438(Ft.)
  '     '    velocity=    7.149(Ft/s)
  '     '        area =      2.073(Sq.Ft)
  '     '        Froude number =     2.221

Upstream point elevation =   235.000(Ft.)
Downstream point elevation =   221.000(Ft.)
Flow length =   325.000(Ft.)
Travel time  =    0.76 min.
Time of concentration =   16.16 min.
Depth of flow =   0.644(Ft.)
Average velocity =   7.149(Ft/s)
Total irregular channel flow =    14.817(CFS)
Irregular channel normal depth above invert elev. =   0.644(Ft.)
Average velocity of channel(s) =   7.149(Ft/s)

Sub-Channel No. 1 Critical depth =      0.883(Ft.)
  '     '       '     Critical flow top width =      8.828(Ft.)
  '     '       '     Critical flow velocity=    3.802(Ft/s)
  '     '       '     Critical flow area =      3.897(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.822(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.820(CFS) for    0.830(Ac.)
Total runoff =     15.220(CFS)  Total area =      15.15(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   217.000(Ft.)
```

```
Downstream point/station elevation =   200.000(Ft.)
Pipe length  =   386.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.220(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    15.220(CFS)
Normal flow depth in pipe =   10.99(In.)
Flow top width inside pipe =   17.55(In.)
Critical Depth =   16.92(In.)
Pipe flow velocity =     13.46(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =    16.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     15.150(Ac.)
Runoff from this stream =     15.220(CFS)
Time of concentration =   16.64 min.
Rainfall intensity =     2.789(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      113.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Initial subarea flow distance  =   52.000(Ft.)
Highest elevation =  251.000(Ft.)
Lowest elevation =  239.000(Ft.)
Elevation difference =   12.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     2.74 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*(  52.000^.5)/(  23.077^(1/3)]=   2.74
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 = 0.500
Subarea runoff =      0.219(CFS)
Total initial stream area =       0.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      114.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
```

```
Estimated mean flow rate at midpoint of channel =      0.647(CFS)
Depth of flow =   0.148(Ft.), Average velocity =   5.939(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              5.00              0.00
        3             10.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.647(CFS)
  '     '        flow top width =      1.477(Ft.)
  '     '    velocity=    5.939(Ft/s)
  '     '        area =      0.109(Sq.Ft)
  '     '        Froude number =     3.852

Upstream point elevation =   239.000(Ft.)
Downstream point elevation =   221.000(Ft.)
Flow length =    85.000(Ft.)
Travel time  =    0.24 min.
Time of concentration =    5.24 min.
Depth of flow =   0.148(Ft.)
Average velocity =   5.939(Ft/s)
Total irregular channel flow =     0.647(CFS)
Irregular channel normal depth above invert elev. =   0.148(Ft.)
Average velocity of channel(s) =   5.939(Ft/s)

Sub-Channel No. 1 Critical depth =      0.254(Ft.)
  '     '       '     Critical flow top width =      2.539(Ft.)
  '     '       '     Critical flow velocity=    2.008(Ft/s)
  '     '       '     Critical flow area =      0.322(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.500 given for subarea
Rainfall intensity =      4.307(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.840(CFS) for    0.390(Ac.)
Total runoff =      1.059(CFS)  Total area =       0.49(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   217.000(Ft.)
Downstream point/station elevation =   213.000(Ft.)
Pipe length  =   427.00(Ft.)   Manning's N = 0.013
```

```
No. of pipes = 1  Required pipe flow  =     1.059(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.059(CFS)
Normal flow depth in pipe =    5.34(In.)
Flow top width inside pipe =    8.84(In.)
Critical Depth =    5.67(In.)
Pipe flow velocity =      3.87(Ft/s)
Travel time through pipe =    1.84 min.
Time of concentration (TC) =     7.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      115.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.08 min.
Rainfall intensity =      3.831(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      2.433(CFS) for    1.270(Ac.)
Total runoff =      3.492(CFS)  Total area =       1.76(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   213.000(Ft.)
Downstream point/station elevation =   204.500(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.492(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.492(CFS)
Normal flow depth in pipe =    5.48(In.)
Flow top width inside pipe =    8.78(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.40(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     7.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.20 min.
Rainfall intensity =      3.806(In/Hr) for a   100.0 year storm
```

```
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.247(CFS) for    0.130(Ac.)
Total runoff =      3.739(CFS)  Total area =        1.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      117.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   204.500(Ft.)
Downstream point/station elevation =   204.000(Ft.)
Pipe length  =    82.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.739(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.739(CFS)
Normal flow depth in pipe =    9.61(In.)
Flow top width inside pipe =   14.39(In.)
Critical Depth =    9.38(In.)
Pipe flow velocity =      4.50(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =     7.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      109.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.50 min.
Rainfall intensity =      3.748(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.312(CFS) for    0.700(Ac.)
Total runoff =      5.051(CFS)  Total area =        2.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.50 min.
Rainfall intensity =      3.748(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      2.680(CFS) for    1.430(Ac.)
Total runoff =      7.731(CFS)  Total area =        4.02(Ac.)


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

```
Process from Point/Station      109.000 to Point/Station      109.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.50 min.
Rainfall intensity =      3.748(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.687(CFS) for    0.900(Ac.)
Total runoff =      9.417(CFS)  Total area =        4.92(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      4.920(Ac.)
Runoff from this stream =      9.417(CFS)
Time of concentration =    7.50 min.
Rainfall intensity =     3.748(In/Hr)
Summary of stream data:

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


1       15.220     16.64                 2.789
2        9.417      7.50                 3.748
Qmax(1) =
           1.000 *    1.000 *    15.220) +
           0.744 *    1.000 *     9.417) + =      22.227
Qmax(2) =
           1.000 *    0.451 *    15.220) +
           1.000 *    1.000 *     9.417) + =      16.280

Total of 2 streams to confluence:
Flow rates before confluence point:
      15.220       9.417
Maximum flow rates at confluence using above data:
       22.227       16.280
Area of streams before confluence:
       15.150        4.920
Results of confluence:
Total flow rate =     22.227(CFS)
Time of concentration =    16.636 min.
Effective stream area after confluence =      20.070(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   200.000(Ft.)
Downstream point/station elevation =   199.000(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.227(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    22.227(CFS)
Normal flow depth in pipe =   17.06(In.)
Flow top width inside pipe =   16.39(In.)
Critical Depth =   19.70(In.)
Pipe flow velocity =     10.62(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    16.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     22.709(CFS)
Depth of flow =   0.700(Ft.), Average velocity =  11.580(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              4.00              0.00
        3              8.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =     22.709(CFS)
  '     '        flow top width =      5.602(Ft.)
  '     '    velocity=   11.580(Ft/s)
  '     '        area =      1.961(Sq.Ft)
  '     '        Froude number =     3.449

Upstream point elevation =   199.000(Ft.)
Downstream point elevation =   158.000(Ft.)
Flow length =   400.000(Ft.)
Travel time  =    0.58 min.
Time of concentration =   17.29 min.
Depth of flow =   0.700(Ft.)
Average velocity =  11.580(Ft/s)
Total irregular channel flow =    22.709(CFS)
Irregular channel normal depth above invert elev. =   0.700(Ft.)
```

```
Average velocity of channel(s) =  11.580(Ft/s)

Sub-Channel No. 1 Critical depth =      1.133(Ft.)
  '     '       '     Critical flow top width =      8.000(Ft.)
  '     '       '     Critical flow velocity=    4.486(Ft/s)
  '     '       '     Critical flow area =      5.063(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.746(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.836(CFS) for    0.870(Ac.)
Total runoff =     23.063(CFS)  Total area =      20.94(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =    17.29 min.
Rainfall intensity =      2.746(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      3.899(CFS) for    2.840(Ac.)
Total runoff =     26.962(CFS)  Total area =      23.78(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =    17.29 min.
Rainfall intensity =      2.746(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      2.100(CFS) for    1.530(Ac.)
Total runoff =     29.062(CFS)  Total area =      25.31(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    17.29 min.
Rainfall intensity =      2.746(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.336(CFS) for    1.390(Ac.)
```

```
Total runoff =     30.398(CFS)  Total area =       26.70(Ac.)
End of computations, total study area =          26.700 (Ac.)
```

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/18/18
-------------------------------------------------------------------------
PROPOSED CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 2


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

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


Program License Serial Number 6116

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

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


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
_______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Initial subarea flow distance  =   77.000(Ft.)
Highest elevation =  237.100(Ft.)
Lowest elevation =  228.000(Ft.)
Elevation difference =    9.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.16 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*(  77.000^.5)/(  11.818^(1/3)]=   4.16
```

```
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 = 0.500
Subarea runoff =      0.593(CFS)
Total initial stream area =        0.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   225.000(Ft.)
Downstream point/station elevation =   223.400(Ft.)
Pipe length  =    78.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.593(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.593(CFS)
Normal flow depth in pipe =    3.83(In.)
Flow top width inside pipe =    5.76(In.)
Critical Depth =    4.70(In.)
Pipe flow velocity =      4.48(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =     5.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     5.29 min.
Rainfall intensity =      4.290(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.493(CFS) for    0.230(Ac.)
Total runoff =      1.086(CFS)  Total area =        0.50(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   223.400(Ft.)
Downstream point/station elevation =   216.900(Ft.)
Pipe length  =   218.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.086(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.086(CFS)
Normal flow depth in pipe =    3.85(In.)
```

```
Flow top width inside pipe =    8.90(In.)
Critical Depth =    5.74(In.)
Pipe flow velocity =      6.02(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =     5.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     5.89 min.
Rainfall intensity =      4.109(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.760(CFS) for    0.370(Ac.)
Total runoff =      1.846(CFS)  Total area =        0.87(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   216.900(Ft.)
Downstream point/station elevation =   212.000(Ft.)
Pipe length  =   165.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.846(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.846(CFS)
Normal flow depth in pipe =    5.27(In.)
Flow top width inside pipe =    8.87(In.)
Critical Depth =    7.45(In.)
Pipe flow velocity =      6.86(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =     6.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     6.29 min.
Rainfall intensity =      4.006(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.901(CFS) for    0.450(Ac.)
Total runoff =      2.747(CFS)  Total area =        1.32(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   209.000(Ft.)
Downstream point/station elevation =   207.000(Ft.)
Pipe length  =   102.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.747(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.747(CFS)
Normal flow depth in pipe =    6.36(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    8.52(In.)
Pipe flow velocity =      6.51(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =     6.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     6.56 min.
Rainfall intensity =      3.943(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.789(CFS) for    0.400(Ac.)
Total runoff =      3.536(CFS)  Total area =       1.72(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   207.000(Ft.)
Downstream point/station elevation =   200.000(Ft.)
Pipe length  =   107.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.536(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.536(CFS)
Normal flow depth in pipe =    6.30(In.)
Flow top width inside pipe =    8.24(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.70(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     6.72 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      206.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     6.72 min.
Rainfall intensity =      3.906(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.918(CFS) for    0.470(Ac.)
Total runoff =      4.454(CFS)  Total area =        2.19(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      206.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     6.72 min.
Rainfall intensity =      3.906(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.172(CFS) for    0.600(Ac.)
Total runoff =      5.625(CFS)  Total area =        2.79(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   200.000(Ft.)
Downstream point/station elevation =   199.000(Ft.)
Pipe length  =    56.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.625(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.625(CFS)
Normal flow depth in pipe =    8.82(In.)
Flow top width inside pipe =   14.76(In.)
Critical Depth =   11.52(In.)
Pipe flow velocity =      7.49(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     6.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      208.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      5.837(CFS)
```

```
Depth of flow =   0.608(Ft.), Average velocity =  10.513(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.50              0.00
        3              3.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      5.837(CFS)
  '     '        flow top width =      1.825(Ft.)
  '     '    velocity=   10.513(Ft/s)
  '     '        area =      0.555(Sq.Ft)
  '     '        Froude number =     3.359

Upstream point elevation =   199.000(Ft.)
Downstream point elevation =   186.500(Ft.)
Flow length =   204.000(Ft.)
Travel time  =    0.32 min.
Time of concentration =    7.17 min.
Depth of flow =   0.608(Ft.)
Average velocity =  10.513(Ft/s)
Total irregular channel flow =     5.837(CFS)
Irregular channel normal depth above invert elev. =   0.608(Ft.)
Average velocity of channel(s) =  10.513(Ft/s)

Sub-Channel No. 1 Critical depth =      0.984(Ft.)
  '     '       '     Critical flow top width =      2.953(Ft.)
  '     '       '     Critical flow velocity=    4.016(Ft/s)
  '     '       '     Critical flow area =      1.453(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.500 given for subarea
Rainfall intensity =      3.812(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.400(CFS) for    0.210(Ac.)
Total runoff =      6.026(CFS)  Total area =       3.00(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      209.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.254(Ft.), Average velocity =   5.620(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
```

```
Point number      'X' coordinate     'Y' coordinate
        1             0.00              0.30
        2             5.00              0.00
        3            10.00              0.30
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      6.026(CFS)
  '     '        flow top width =      8.455(Ft.)
  '     '    velocity=    5.620(Ft/s)
  '     '        area =      1.072(Sq.Ft)
  '     '        Froude number =     2.781

Upstream point elevation =   186.500(Ft.)
Downstream point elevation =   182.000(Ft.)
Flow length =    50.000(Ft.)
Travel time  =    0.15 min.
Time of concentration =    7.32 min.
Depth of flow =   0.254(Ft.)
Average velocity =   5.620(Ft/s)
Total irregular channel flow =     6.026(CFS)
Irregular channel normal depth above invert elev. =   0.254(Ft.)
Average velocity of channel(s) =   5.620(Ft/s)

Sub-Channel No. 1 Critical depth =      0.375(Ft.)
  '     '      '     Critical flow top width =     10.000(Ft.)
  '     '      '     Critical flow velocity=    2.678(Ft/s)
  '     '      '     Critical flow area =      2.250(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      6.458(CFS)
Depth of flow =   0.594(Ft.), Average velocity =  12.185(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              1.00
        2             1.50              0.00
        3             3.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      6.458(CFS)
  '     '        flow top width =      1.783(Ft.)
  '     '    velocity=   12.185(Ft/s)
```

```
  '     '         area =      0.530(Sq.Ft)
  '     '         Froude number =     3.939

Upstream point elevation =   182.000(Ft.)
Downstream point elevation =   177.500(Ft.)
Flow length =    53.000(Ft.)
Travel time  =    0.07 min.
Time of concentration =    7.39 min.
Depth of flow =   0.594(Ft.)
Average velocity =  12.185(Ft/s)
Total irregular channel flow =     6.458(CFS)
Irregular channel normal depth above invert elev. =   0.594(Ft.)
Average velocity of channel(s) =  12.185(Ft/s)

Sub-Channel No. 1 Critical depth =      1.023(Ft.)
  '     '       '     Critical flow top width =      3.000(Ft.)
  '     '       '     Critical flow velocity=    4.112(Ft/s)
  '     '       '     Critical flow area =      1.570(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.500 given for subarea
Rainfall intensity =      3.769(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.810(CFS) for    0.430(Ac.)
Total runoff =      6.836(CFS)  Total area =       3.43(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      210.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.39 min.
Rainfall intensity =      3.769(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.338(CFS) for    0.710(Ac.)
Total runoff =      8.174(CFS)  Total area =       4.14(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      8.440(CFS)
Depth of flow =   0.608(Ft.), Average velocity =  15.240(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
```

```
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              1.50              0.00
        3              3.00              1.00
Manning's 'N' friction factor =   0.014
-----------------------------------------------------------------
Sub-Channel flow  =      8.440(CFS)
  '     '        flow top width =      1.823(Ft.)
  '     '    velocity=   15.240(Ft/s)
  '     '        area =      0.554(Sq.Ft)
  '     '        Froude number =     4.873

Upstream point elevation =   177.500(Ft.)
Downstream point elevation =   150.800(Ft.)
Flow length =   207.000(Ft.)
Travel time  =    0.23 min.
Time of concentration =    7.62 min.
Depth of flow =   0.608(Ft.)
Average velocity =  15.240(Ft/s)
Total irregular channel flow =     8.440(CFS)
Irregular channel normal depth above invert elev. =   0.608(Ft.)
Average velocity of channel(s) =  15.240(Ft/s)

Sub-Channel No. 1 Critical depth =      1.125(Ft.)
  '     '       '     Critical flow top width =      3.000(Ft.)
  '     '       '     Critical flow velocity=    4.502(Ft/s)
  '     '       '     Critical flow area =      1.875(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.727(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.352(CFS) for    0.270(Ac.)
Total runoff =      8.526(CFS)  Total area =        4.41(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      211.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =     7.62 min.
Rainfall intensity =      3.727(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.770(CFS) for    0.590(Ac.)
Total runoff =      9.295(CFS)  Total area =        5.00(Ac.)
End of computations, total study area =           5.000 (Ac.)
```

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/18/18
------------------------------------------------------------------------
PROPOSED CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 4


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Initial subarea flow distance  =   97.000(Ft.)
Highest elevation =  255.400(Ft.)
Lowest elevation =  251.000(Ft.)
Elevation difference =    4.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*(  97.000^.5)/( 4.536^(1/3)]=   6.43
```

```
Rainfall intensity (I) =      3.974(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =      0.656(CFS)
Total initial stream area =        0.330(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   248.000(Ft.)
Downstream point/station elevation =   245.000(Ft.)
Pipe length  =   147.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.656(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.656(CFS)
Normal flow depth in pipe =    4.13(In.)
Flow top width inside pipe =    5.56(In.)
Critical Depth =    4.92(In.)
Pipe flow velocity =      4.55(Ft/s)
Travel time through pipe =    0.54 min.
Time of concentration (TC) =     6.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      402.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     6.96 min.
Rainfall intensity =      3.854(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.597(CFS) for    0.310(Ac.)
Total runoff =      1.253(CFS)  Total area =        0.64(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   245.000(Ft.)
Downstream point/station elevation =   222.500(Ft.)
Pipe length  =   144.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.253(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.253(CFS)
Normal flow depth in pipe =    3.23(In.)
Flow top width inside pipe =    5.98(In.)
```

```
Critical depth could not be calculated.
Pipe flow velocity =     11.64(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     7.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      403.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.17 min.
Rainfall intensity =      3.812(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.419(CFS) for    0.220(Ac.)
Total runoff =      1.672(CFS)  Total area =       0.86(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   222.500(Ft.)
Downstream point/station elevation =   222.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.672(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.672(CFS)
Normal flow depth in pipe =    5.23(In.)
Flow top width inside pipe =    8.88(In.)
Critical Depth =    7.13(In.)
Pipe flow velocity =      6.28(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      404.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.22 min.
Rainfall intensity =      3.801(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.425(CFS) for    0.750(Ac.)
Total runoff =      3.098(CFS)  Total area =       1.61(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      405.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   219.000(Ft.)
Downstream point/station elevation =   214.000(Ft.)
Pipe length  =   145.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.098(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.098(CFS)
Normal flow depth in pipe =    5.78(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    9.05(In.)
Pipe flow velocity =      8.29(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =     7.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      405.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.51 min.
Rainfall intensity =      3.745(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.405(CFS) for    0.750(Ac.)
Total runoff =      4.502(CFS)  Total area =       2.36(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      405.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.51 min.
Rainfall intensity =      3.745(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.618(CFS) for    0.330(Ac.)
Total runoff =      5.120(CFS)  Total area =       2.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      405.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
Time of concentration =     7.51 min.
```

```
Rainfall intensity =      3.745(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.599(CFS) for    0.320(Ac.)
Total runoff =      5.720(CFS)  Total area =       3.01(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   214.000(Ft.)
Downstream point/station elevation =   213.000(Ft.)
Pipe length  =    82.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.720(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.720(CFS)
Normal flow depth in pipe =   10.17(In.)
Flow top width inside pipe =   14.02(In.)
Critical Depth =   11.61(In.)
Pipe flow velocity =      6.46(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     7.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      406.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =     7.73 min.
Rainfall intensity =      3.707(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.143(CFS) for    0.110(Ac.)
Total runoff =      5.862(CFS)  Total area =       3.12(Ac.)
End of computations, total study area =          3.120 (Ac.)
```

```
                San Diego County Rational Hydrology Program

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

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 08/20/18
------------------------------------------------------------------------
PROPOSED CONDITION HYDROLOGY ANALYSIS
BEYER PARK
DISCHARGE POINT 5


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

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


Program License Serial Number 6116

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =   74.000(Ft.)
Highest elevation =  347.500(Ft.)
Lowest elevation =  337.000(Ft.)
Elevation difference =   10.500(Ft.)
TC=[(11.9*0.0140^3)/( 10.50)]^.385=  0.46 + 10 min. =    10.46 min.
```

```
Rainfall intensity (I) =      3.320(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.139(CFS)
Total initial stream area =       0.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.488(CFS)
Depth of flow =   0.105(Ft.), Average velocity =   4.419(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              5.00              0.00
        3             10.00              0.50
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.488(CFS)
  '     '        flow top width =      2.102(Ft.)
  '     '    velocity=    4.419(Ft/s)
  '     '        area =      0.110(Sq.Ft)
  '     '        Froude number =     3.397

Upstream point elevation =   337.000(Ft.)
Downstream point elevation =   284.000(Ft.)
Flow length =   293.000(Ft.)
Travel time  =    1.11 min.
Time of concentration =   11.56 min.
Depth of flow =   0.105(Ft.)
Average velocity =   4.419(Ft/s)
Total irregular channel flow =     0.488(CFS)
Irregular channel normal depth above invert elev. =   0.105(Ft.)
Average velocity of channel(s) =   4.419(Ft/s)

Sub-Channel No. 1 Critical depth =      0.172(Ft.)
  '     '       '     Critical flow top width =      3.438(Ft.)
  '     '       '     Critical flow velocity=    1.652(Ft/s)
  '     '       '     Critical flow area =      0.295(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.201(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      0.672(CFS) for    0.600(Ac.)
```

```
Total runoff =      0.812(CFS)  Total area =        0.72(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.330(CFS)
Depth of flow =   0.390(Ft.), Average velocity =   8.749(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              2.00
        2              2.00              0.00
        3              4.00              2.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      1.330(CFS)
  '     '        flow top width =      0.780(Ft.)
  '     '    velocity=    8.749(Ft/s)
  '     '        area =      0.152(Sq.Ft)
  '     '        Froude number =     3.492

Upstream point elevation =   284.000(Ft.)
Downstream point elevation =   225.200(Ft.)
Flow length =   302.000(Ft.)
Travel time  =    0.58 min.
Time of concentration =   12.14 min.
Depth of flow =   0.390(Ft.)
Average velocity =   8.749(Ft/s)
Total irregular channel flow =     1.330(CFS)
Irregular channel normal depth above invert elev. =   0.390(Ft.)
Average velocity of channel(s) =   8.749(Ft/s)

Sub-Channel No. 1 Critical depth =      0.641(Ft.)
  '     '       '     Critical flow top width =      1.281(Ft.)
  '     '       '     Critical flow velocity=    3.242(Ft/s)
  '     '       '     Critical flow area =      0.410(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.145(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.013(CFS) for    0.920(Ac.)
Total runoff =      1.824(CFS)  Total area =        1.64(Ac.)
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.203(CFS)
Depth of flow =   0.350(Ft.), Average velocity =   5.997(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2              3.00              0.00
        3              6.00              1.00
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      2.203(CFS)
  '     '        flow top width =      2.099(Ft.)
  '     '    velocity=    5.997(Ft/s)
  '     '        area =      0.367(Sq.Ft)
  '     '        Froude number =     2.527

Upstream point elevation =   249.500(Ft.)
Downstream point elevation =   247.000(Ft.)
Flow length =    35.000(Ft.)
Travel time  =    0.10 min.
Time of concentration =   12.23 min.
Depth of flow =   0.350(Ft.)
Average velocity =   5.997(Ft/s)
Total irregular channel flow =     2.203(CFS)
Irregular channel normal depth above invert elev. =   0.350(Ft.)
Average velocity of channel(s) =   5.997(Ft/s)

Sub-Channel No. 1 Critical depth =      0.508(Ft.)
  '     '       '     Critical flow top width =      3.047(Ft.)
  '     '       '     Critical flow velocity=    2.847(Ft/s)
  '     '       '     Critical flow area =      0.774(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.500 given for subarea
Rainfall intensity =      3.136(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      1.066(CFS) for    0.680(Ac.)
Total runoff =      2.891(CFS)  Total area =       2.32(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      504.000
**** SUBAREA FLOW ADDITION ****
```

```
User specified 'C' value of 0.350 given for subarea
Time of concentration =    12.23 min.
Rainfall intensity =      3.136(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.010(CFS) for    0.920(Ac.)
Total runoff =      3.900(CFS)  Total area =       3.24(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   243.000(Ft.)
Downstream point/station elevation =   224.000(Ft.)
Pipe length  =   181.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.900(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.900(CFS)
Normal flow depth in pipe =    5.70(In.)
Flow top width inside pipe =    8.68(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.23(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    12.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      506.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   224.000(Ft.)
Downstream point/station elevation =   222.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.900(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.900(CFS)
Normal flow depth in pipe =    6.13(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =   10.06(In.)
Pipe flow velocity =      9.65(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    12.54 min.
End of computations, total study area =          3.240 (Ac.)
```

PEAK FLOW RATE SUMMARY

Analysis Point	Discharge Point	Drainage Area (acres) Existing Condition	Drainage Area (acres) Proposed Condition	100 Yr Flow (cfs) Existing Condition	100 Yr Flow (cfs) Proposed Condition	100 Yr Flow (cfs) Mitigated Condition	% Change from Existing Condition
A	#1	24.75	26.70	25.00	30.40	23.87	**-4.5**
B	#2	5.56	5.00	5.77	9.30	6.43	**11.4**
	#3	0.90	0.00	1.00	0.00	0.00	**-100.0**
Sub-Total		**6.46**	**5.00**	**6.77**	**9.30**	**6.43**	**-5.0**
C	#4	1.82	3.12	1.94	5.86	3.19	**64.4**
	#5	4.70	3.24	5.20	3.90	3.90	**-25.0**
Sub-Total		**6.52**	**6.36**	**7.14**	**9.76**	**7.09**	**-0.7**
	#6	1.17	0.84	**Not Analyzed**			
Total		**38.90**	**38.90**	**38.91**	**49.46**	**37.39**	**-3.9**

40 0 80 160
SCALE IN FEET
1 inch = 80 ft.

LEGEND

LEGEND	SYMBOL
OUTER BASIN BOUNDARY	━━━━━
MAJOR BASIN BOUNDARY	━━ ▪ ━━
MINOR BASIN BOUNDARY	▪ ▪ ▪ ▪ ▪
EXISTING STORM DRAIN	—— SD ——
NEW STORM DRAIN	—— SD ——
EXISTING CONTOUR	– – XXX – –
NEW CONTOUR	XXX XXX
FLOW DIRECTION	⟶
FLOW PATH	→ → → → →
FLOW LENGTH	L=XX.X'
NODE/CONTOUR ELEVATION	307.85FL 304.35IE
HYDROLOGY NODE	200
DISCHARGE POINT	1
DRAINAGE BASIN MARKER & AREA (AC)	B–X X.XX
ANALYSIS POINT	D

BWE
619.299.5550
WWW.BWESD.COM

APPR	DATE	DESCRIPTION	SYM

ISSUE DATE:
DRAWN BY:
CHECKED BY:
BWE JOB NUMBER:
CLIENT JOB NUMBER:
MUNICIPALITY PROJECT NUMBER:

SHEET TITLE

PROPOSED CONDITION HYDROLOGY EXHIBIT

SHEET 1 OF 2

PROJECT

BEYER PARK

SITE ADDRESS

BEYER PARK
SAN DIEGO, CA 92173

PLOT: \\BWE-FIVE\CAD\PROJECTS\12500\12820U.1.00 BEYER PARK\DWGS\EXHIBITS\DRAINAGE\12820U.1.00 PROP-HYDRO.DWG Min GC 8/21/2018 1:52 PM

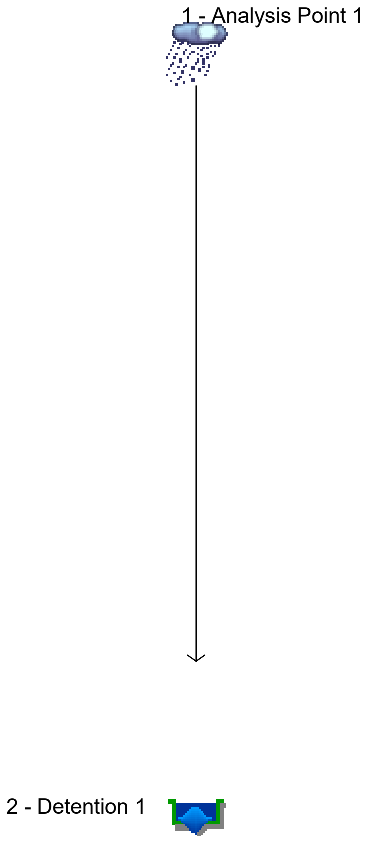
APPENDIX D

Hydraulic Analysis

DETENTION #1 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  8  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  4.92  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  9.42  CFS

TIME (MIN) =  0          DISCHARGE (CFS) =  0
TIME (MIN) =  8          DISCHARGE (CFS) =  0.3
TIME (MIN) =  16         DISCHARGE (CFS) =  0.3
TIME (MIN) =  24         DISCHARGE (CFS) =  0.3
TIME (MIN) =  32         DISCHARGE (CFS) =  0.3
TIME (MIN) =  40         DISCHARGE (CFS) =  0.3
TIME (MIN) =  48         DISCHARGE (CFS) =  0.3
TIME (MIN) =  56         DISCHARGE (CFS) =  0.3
TIME (MIN) =  64         DISCHARGE (CFS) =  0.3
TIME (MIN) =  72         DISCHARGE (CFS) =  0.4
TIME (MIN) =  80         DISCHARGE (CFS) =  0.4
TIME (MIN) =  88         DISCHARGE (CFS) =  0.4
TIME (MIN) =  96         DISCHARGE (CFS) =  0.4
TIME (MIN) =  104        DISCHARGE (CFS) =  0.4
TIME (MIN) =  112        DISCHARGE (CFS) =  0.4
TIME (MIN) =  120        DISCHARGE (CFS) =  0.4
TIME (MIN) =  128        DISCHARGE (CFS) =  0.5
TIME (MIN) =  136        DISCHARGE (CFS) =  0.5
TIME (MIN) =  144        DISCHARGE (CFS) =  0.5
TIME (MIN) =  152        DISCHARGE (CFS) =  0.5
TIME (MIN) =  160        DISCHARGE (CFS) =  0.6
TIME (MIN) =  168        DISCHARGE (CFS) =  0.6
TIME (MIN) =  176        DISCHARGE (CFS) =  0.6
TIME (MIN) =  184        DISCHARGE (CFS) =  0.7
TIME (MIN) =  192        DISCHARGE (CFS) =  0.7
TIME (MIN) =  200        DISCHARGE (CFS) =  0.9
TIME (MIN) =  208        DISCHARGE (CFS) =  0.9
TIME (MIN) =  216        DISCHARGE (CFS) =  1.1
TIME (MIN) =  224        DISCHARGE (CFS) =  1.3
TIME (MIN) =  232        DISCHARGE (CFS) =  1.9
TIME (MIN) =  240        DISCHARGE (CFS) =  2.8
TIME (MIN) =  248        DISCHARGE (CFS) =  9.42
TIME (MIN) =  256        DISCHARGE (CFS) =  1.5
TIME (MIN) =  264        DISCHARGE (CFS) =  1
TIME (MIN) =  272        DISCHARGE (CFS) =  0.8
TIME (MIN) =  280        DISCHARGE (CFS) =  0.7
TIME (MIN) =  288        DISCHARGE (CFS) =  0.6
TIME (MIN) =  296        DISCHARGE (CFS) =  0.5
TIME (MIN) =  304        DISCHARGE (CFS) =  0.5
TIME (MIN) =  312        DISCHARGE (CFS) =  0.4
TIME (MIN) =  320        DISCHARGE (CFS) =  0.4
TIME (MIN) =  328        DISCHARGE (CFS) =  0.4
TIME (MIN) =  336        DISCHARGE (CFS) =  0.4
TIME (MIN) =  344        DISCHARGE (CFS) =  0.3
TIME (MIN) =  352        DISCHARGE (CFS) =  0.3
TIME (MIN) =  360        DISCHARGE (CFS) =  0.3
TIME (MIN) =  368        DISCHARGE (CFS) =  0
```

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	Analysis Point 1
2	Reservoir	Detention 1

Project: Det-1 YR 100.gpw

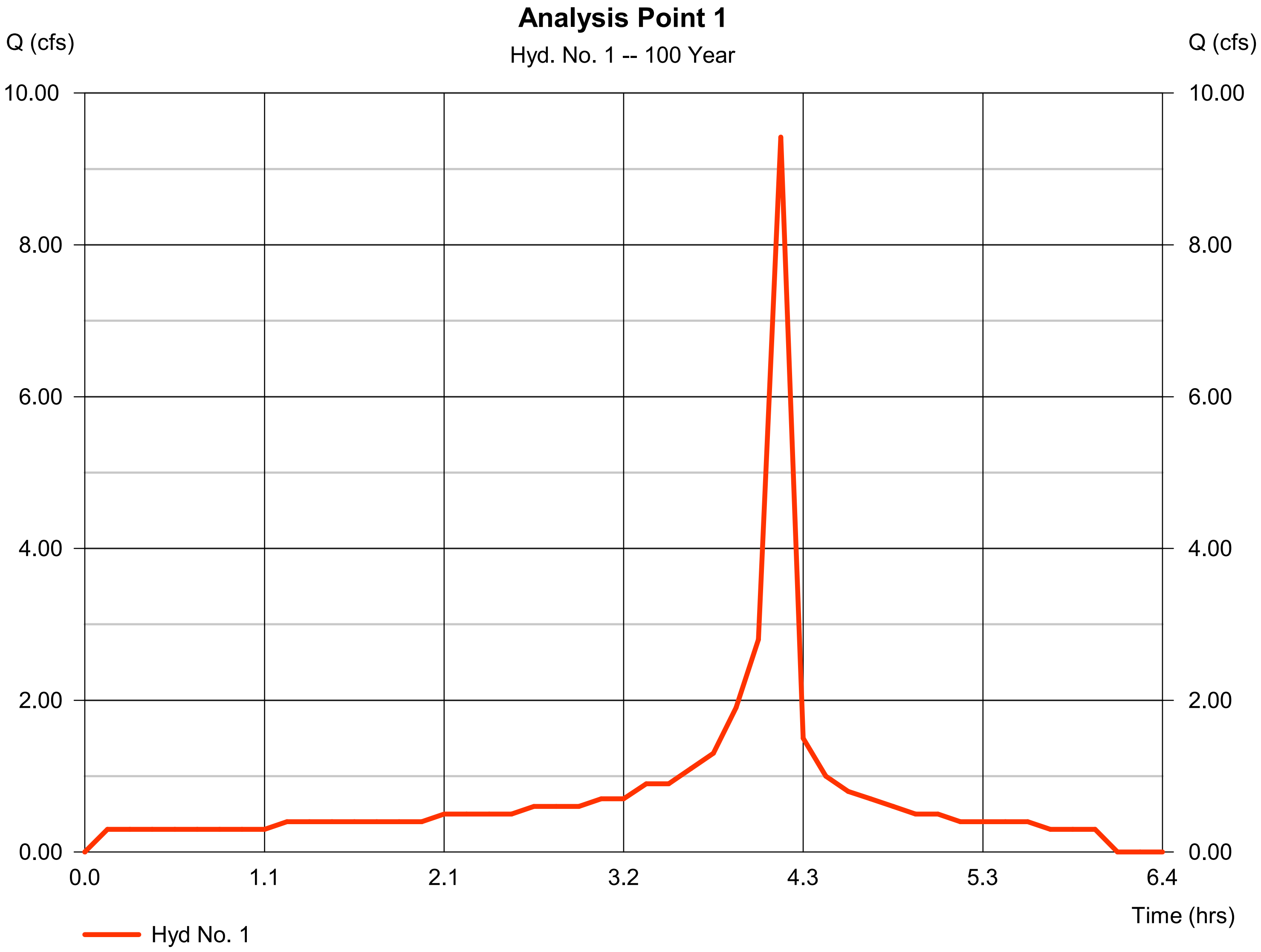
Tuesday, 08 / 21 / 2018

Hydrograph Report

Hyd. No. 1

Analysis Point 1

Hydrograph type	= Manual	Peak discharge	= 9.420 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.13 hrs
Time interval	= 8 min	Hyd. volume	= 17,674 cuft



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

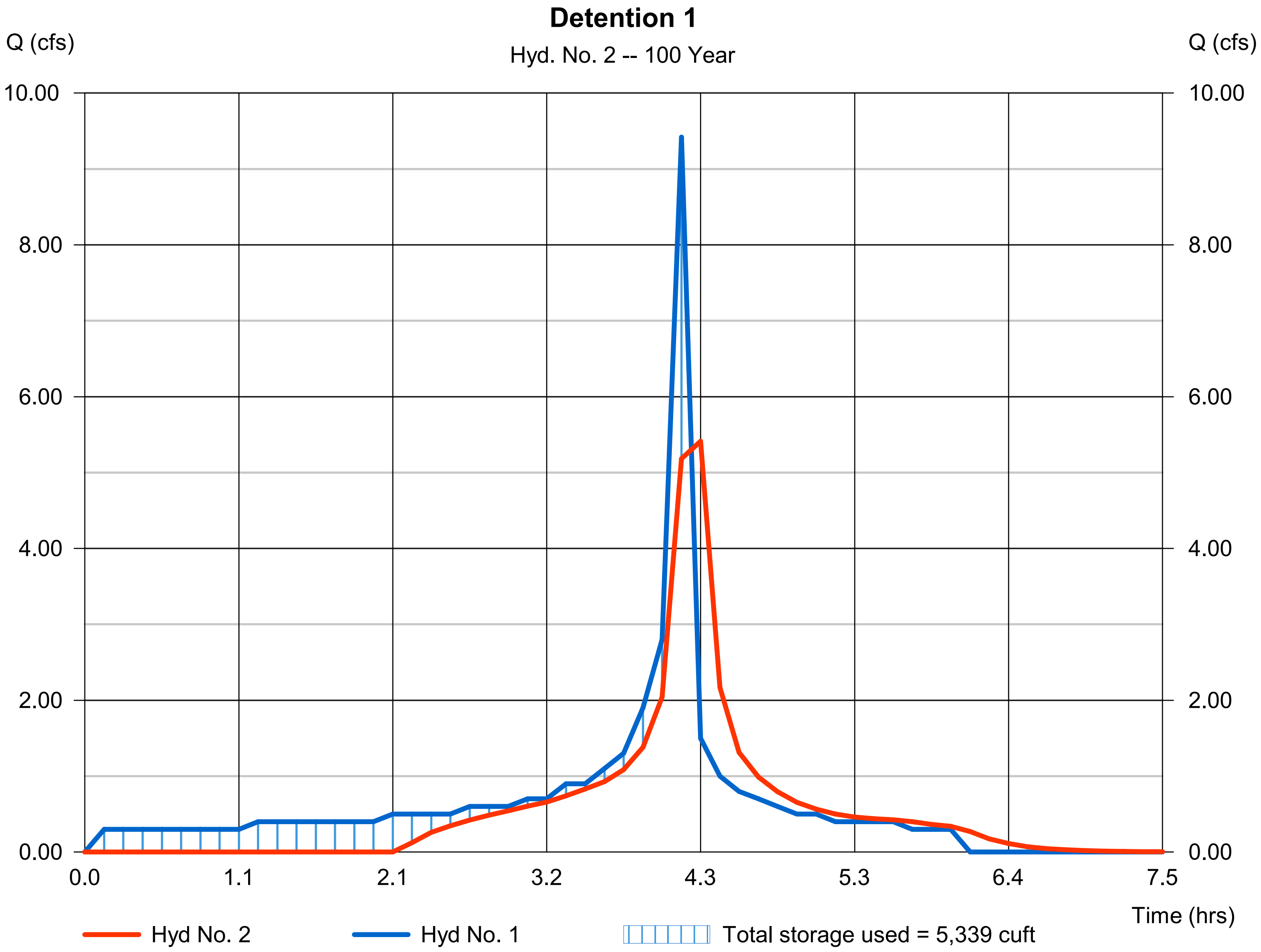
Hyd. No. 2

Detention 1

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 8 min
Inflow hyd. No. = 1 - Analysis Point 1
Reservoir name = bmp #1

Peak discharge = 5.412 cfs
Time to peak = 4.27 hrs
Hyd. volume = 14,980 cuft
Max. Elevation = 205.00 ft
Max. Storage = 5,339 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

Pond No. 1 - bmp #1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	4,650	0	0
1.00	205.00	6,120	5,385	5,385

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	Inactive	Inactive	Inactive
Span (in)	=	18.00	0.90	5.80	24.00
No. Barrels	=	1	1	1	1
Invert El. (ft)	=	202.00	277.67	305.45	48.25
Length (ft)	=	50.00	0.00	0.00	2.00
Slope (%)	=	1.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	4.71	Inactive	Inactive	Inactive
Crest El. (ft)	=	204.50	304.90	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	1	Rect	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

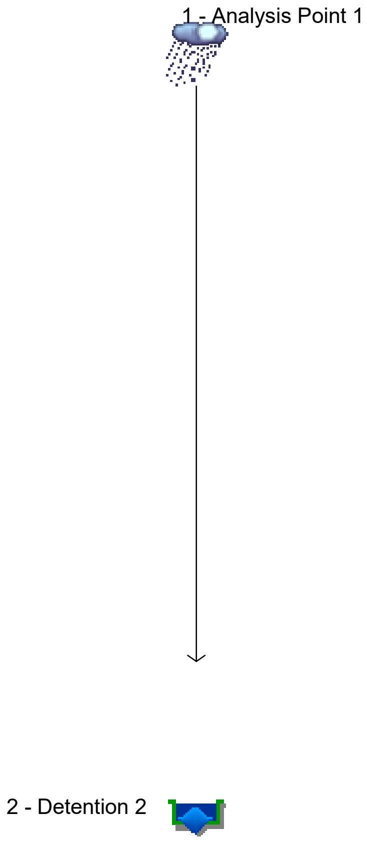
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	5,385	205.00	9.15 oc	0.00	0.00	0.00	5.55	0.00	---	---	---	---	5.545

DETENTION #2 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  7  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  1.76  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  3.5  CFS

TIME (MIN) =  0              DISCHARGE (CFS) =  0
TIME (MIN) =  7              DISCHARGE (CFS) =  0.1
TIME (MIN) =  14             DISCHARGE (CFS) =  0.1
TIME (MIN) =  21             DISCHARGE (CFS) =  0.1
TIME (MIN) =  28             DISCHARGE (CFS) =  0.1
TIME (MIN) =  35             DISCHARGE (CFS) =  0.1
TIME (MIN) =  42             DISCHARGE (CFS) =  0.1
TIME (MIN) =  49             DISCHARGE (CFS) =  0.1
TIME (MIN) =  56             DISCHARGE (CFS) =  0.1
TIME (MIN) =  63             DISCHARGE (CFS) =  0.1
TIME (MIN) =  70             DISCHARGE (CFS) =  0.1
TIME (MIN) =  77             DISCHARGE (CFS) =  0.1
TIME (MIN) =  84             DISCHARGE (CFS) =  0.1
TIME (MIN) =  91             DISCHARGE (CFS) =  0.1
TIME (MIN) =  98             DISCHARGE (CFS) =  0.1
TIME (MIN) =  105            DISCHARGE (CFS) =  0.1
TIME (MIN) =  112            DISCHARGE (CFS) =  0.2
TIME (MIN) =  119            DISCHARGE (CFS) =  0.2
TIME (MIN) =  126            DISCHARGE (CFS) =  0.2
TIME (MIN) =  133            DISCHARGE (CFS) =  0.2
TIME (MIN) =  140            DISCHARGE (CFS) =  0.2
TIME (MIN) =  147            DISCHARGE (CFS) =  0.2
TIME (MIN) =  154            DISCHARGE (CFS) =  0.2
TIME (MIN) =  161            DISCHARGE (CFS) =  0.2
TIME (MIN) =  168            DISCHARGE (CFS) =  0.2
TIME (MIN) =  175            DISCHARGE (CFS) =  0.2
TIME (MIN) =  182            DISCHARGE (CFS) =  0.2
TIME (MIN) =  189            DISCHARGE (CFS) =  0.3
TIME (MIN) =  196            DISCHARGE (CFS) =  0.3
TIME (MIN) =  203            DISCHARGE (CFS) =  0.3
TIME (MIN) =  210            DISCHARGE (CFS) =  0.4
TIME (MIN) =  217            DISCHARGE (CFS) =  0.4
TIME (MIN) =  224            DISCHARGE (CFS) =  0.5
TIME (MIN) =  231            DISCHARGE (CFS) =  0.7
TIME (MIN) =  238            DISCHARGE (CFS) =  1.3
TIME (MIN) =  245            DISCHARGE (CFS) =  3.5
TIME (MIN) =  252            DISCHARGE (CFS) =  0.6
TIME (MIN) =  259            DISCHARGE (CFS) =  0.4
TIME (MIN) =  266            DISCHARGE (CFS) =  0.3
TIME (MIN) =  273            DISCHARGE (CFS) =  0.3
TIME (MIN) =  280            DISCHARGE (CFS) =  0.2
TIME (MIN) =  287            DISCHARGE (CFS) =  0.2
TIME (MIN) =  294            DISCHARGE (CFS) =  0.2
TIME (MIN) =  301            DISCHARGE (CFS) =  0.2
TIME (MIN) =  308            DISCHARGE (CFS) =  0.2
TIME (MIN) =  315            DISCHARGE (CFS) =  0.1
TIME (MIN) =  322            DISCHARGE (CFS) =  0.1
TIME (MIN) =  329            DISCHARGE (CFS) =  0.1
TIME (MIN) =  336            DISCHARGE (CFS) =  0.1
TIME (MIN) =  343            DISCHARGE (CFS) =  0.1
TIME (MIN) =  350            DISCHARGE (CFS) =  0.1
TIME (MIN) =  357            DISCHARGE (CFS) =  0.1
TIME (MIN) =  364            DISCHARGE (CFS) =  0
```

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12



Legend

Hyd.	Origin	Description
1	Manual	Analysis Point 1
2	Reservoir	Detention 2

Project: Det-2 YR 100.gpw

Tuesday, 08 / 21 / 2018

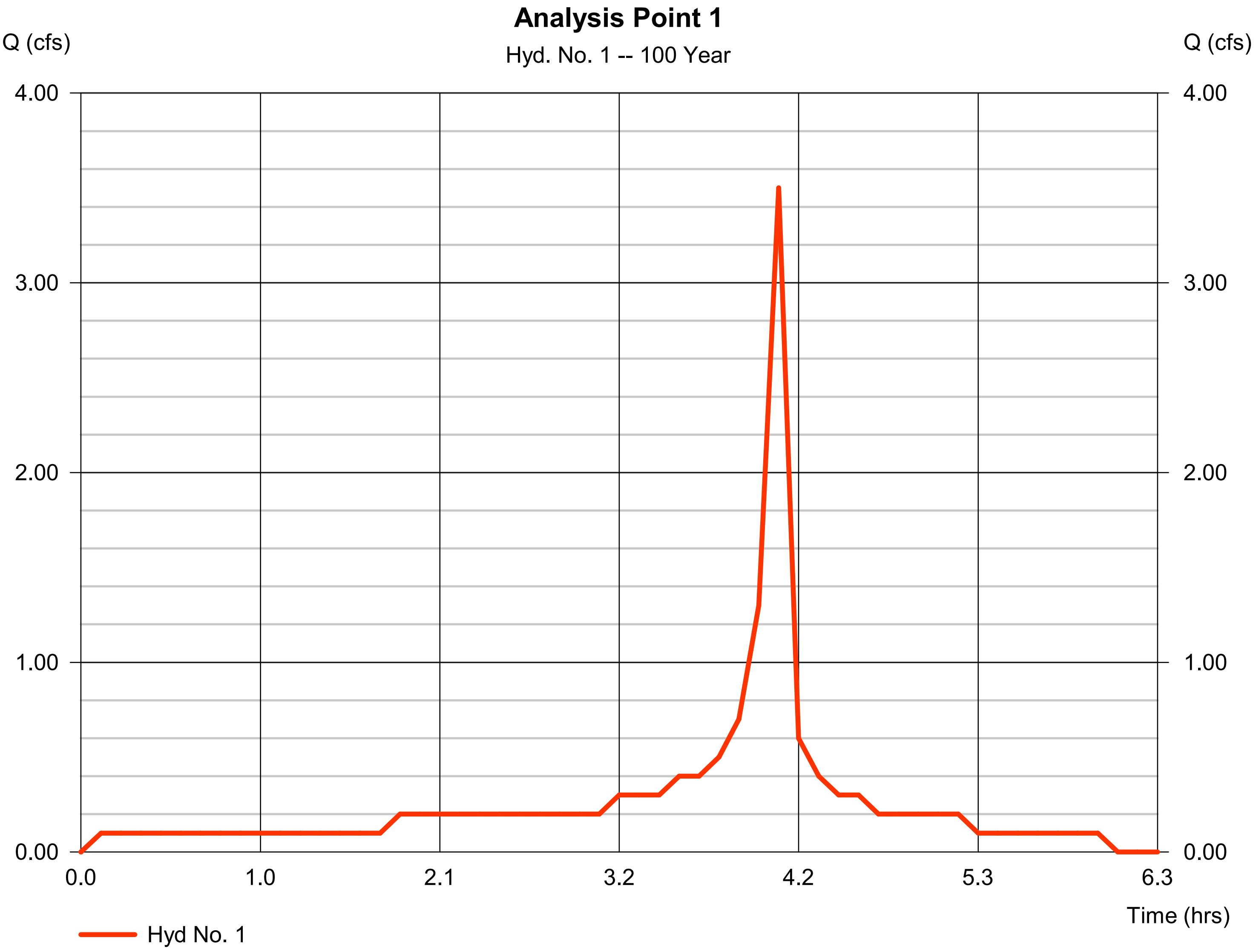
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

Hyd. No. 1

Analysis Point 1

Hydrograph type	= Manual	Peak discharge	= 3.500 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 6,174 cuft



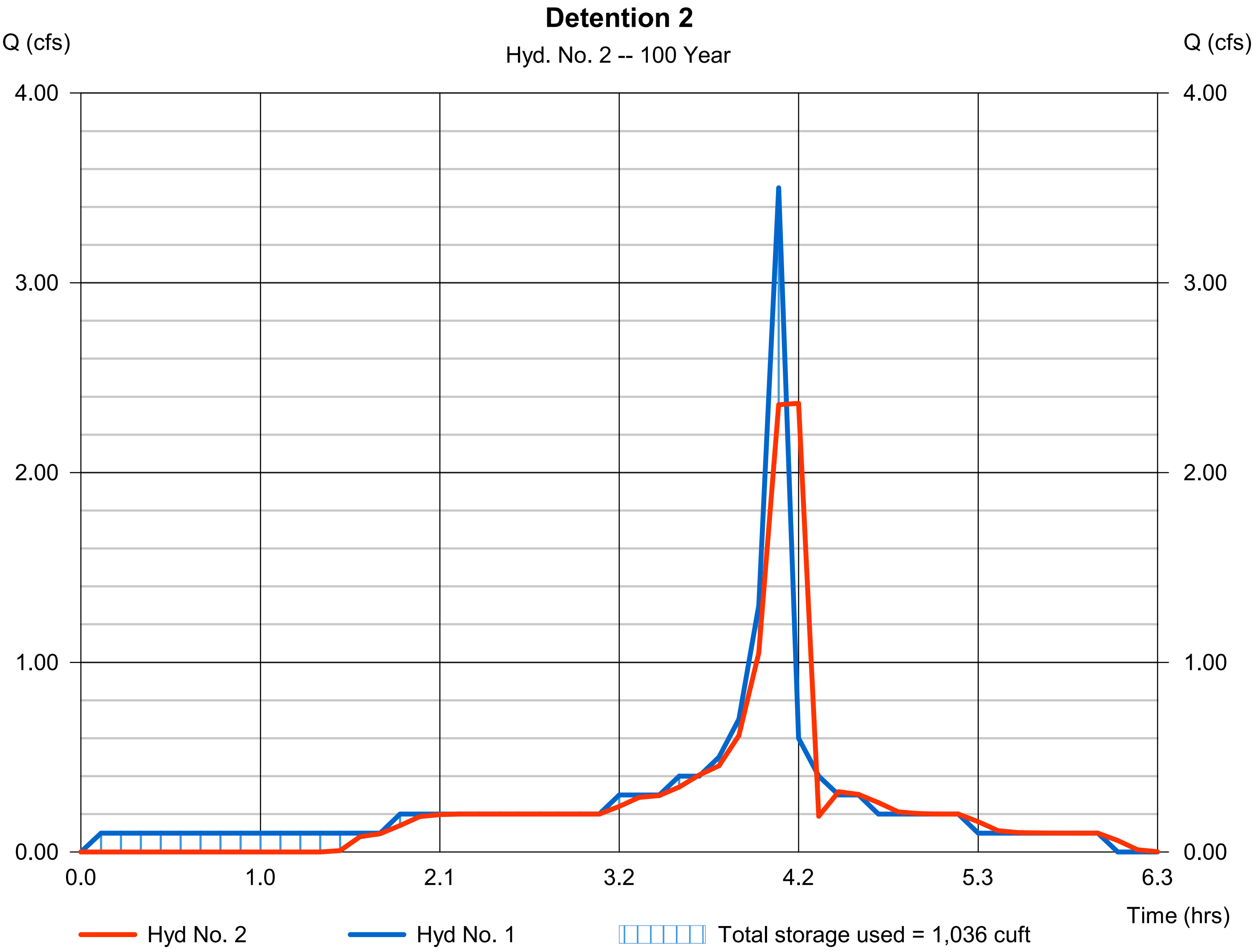
Hydrograph Report

Hyd. No. 2

Detention 2

Hydrograph type	=	Reservoir	Peak discharge	=	2.365 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.20 hrs
Time interval	=	7 min	Hyd. volume	=	5,652 cuft
Inflow hyd. No.	=	1 - Analysis Point 1	Max. Elevation	=	205.00 ft
Reservoir name	=	bmp #2	Max. Storage	=	1,036 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - bmp #2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	765	0	0
1.00	205.00	1,320	1,043	1,043

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	12.00	Inactive	Inactive	Inactive
Span (in)	=	12.00	0.90	5.80	24.00
No. Barrels	=	1	1	1	1
Invert El. (ft)	=	202.00	277.67	305.45	48.25
Length (ft)	=	50.00	0.00	0.00	2.00
Slope (%)	=	1.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	3.14	Inactive	Inactive	Inactive
Crest El. (ft)	=	204.50	304.90	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	1	Rect	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

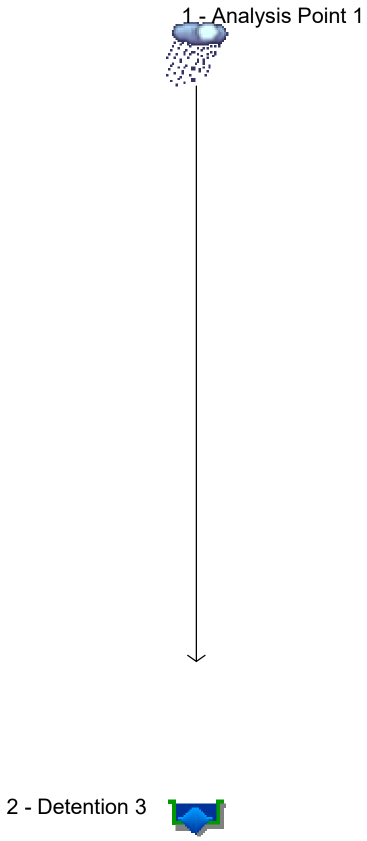
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	1,043	205.00	4.42 oc	0.00	0.00	0.00	2.34 ic	0.00	---	---	---	---	2.343

DETENTION #3 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  17  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  2.84  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  3.9  CFS

TIME (MIN) =  0            DISCHARGE (CFS) =  0
TIME (MIN) =  17           DISCHARGE (CFS) =  0.2
TIME (MIN) =  34           DISCHARGE (CFS) =  0.2
TIME (MIN) =  51           DISCHARGE (CFS) =  0.2
TIME (MIN) =  68           DISCHARGE (CFS) =  0.2
TIME (MIN) =  85           DISCHARGE (CFS) =  0.2
TIME (MIN) =  102          DISCHARGE (CFS) =  0.2
TIME (MIN) =  119          DISCHARGE (CFS) =  0.2
TIME (MIN) =  136          DISCHARGE (CFS) =  0.3
TIME (MIN) =  153          DISCHARGE (CFS) =  0.3
TIME (MIN) =  170          DISCHARGE (CFS) =  0.3
TIME (MIN) =  187          DISCHARGE (CFS) =  0.4
TIME (MIN) =  204          DISCHARGE (CFS) =  0.5
TIME (MIN) =  221          DISCHARGE (CFS) =  0.7
TIME (MIN) =  238          DISCHARGE (CFS) =  0.4
TIME (MIN) =  255          DISCHARGE (CFS) =  3.9
TIME (MIN) =  272          DISCHARGE (CFS) =  0.5
TIME (MIN) =  289          DISCHARGE (CFS) =  0.4
TIME (MIN) =  306          DISCHARGE (CFS) =  0.3
TIME (MIN) =  323          DISCHARGE (CFS) =  0.2
TIME (MIN) =  340          DISCHARGE (CFS) =  0.2
TIME (MIN) =  357          DISCHARGE (CFS) =  0.2
TIME (MIN) =  374          DISCHARGE (CFS) =  0
```

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	Analysis Point 1
2	Reservoir	Detention 3

Project: Det-3 YR 100.gpw	Tuesday, 08 / 21 / 2018

Hydrograph Report

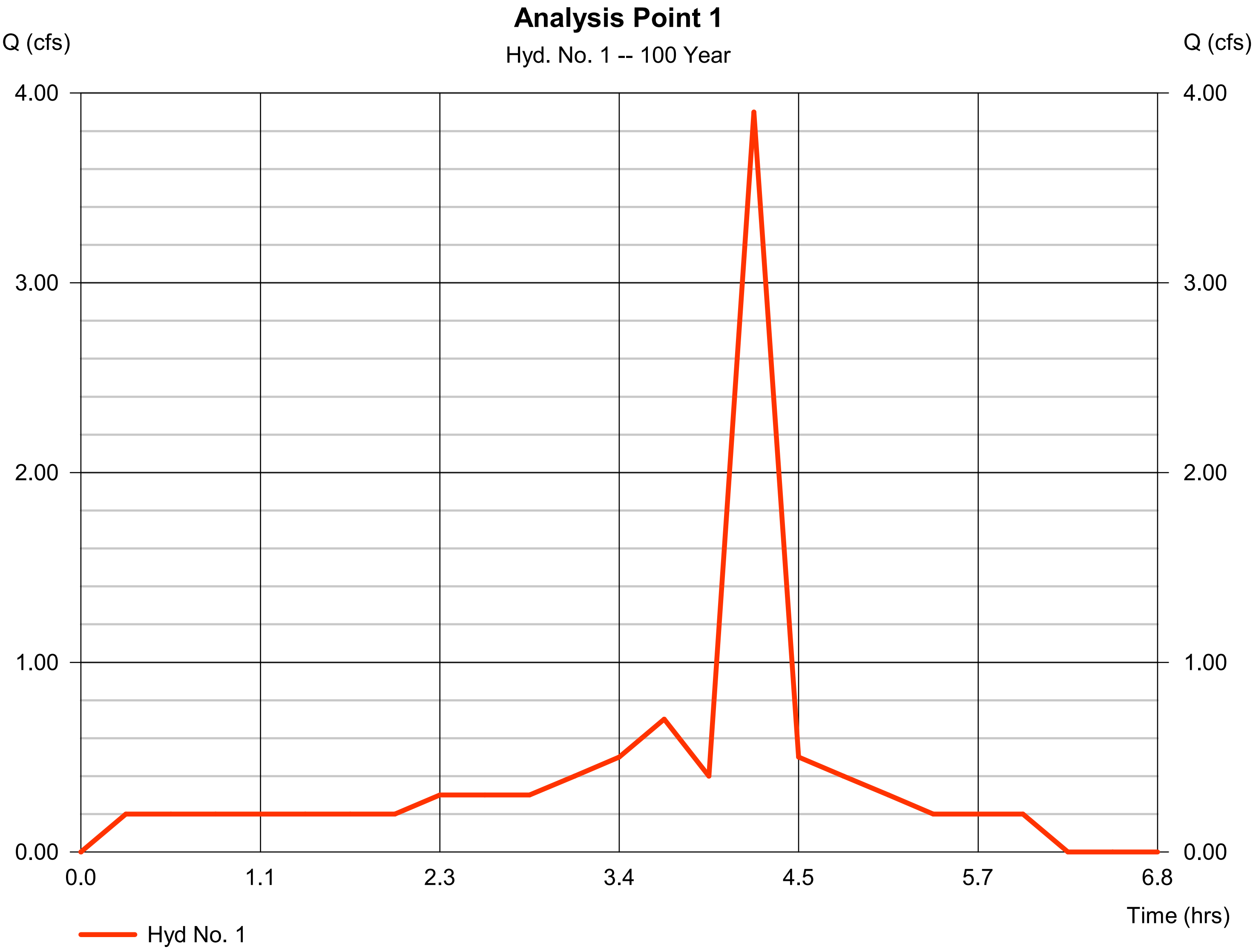
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

Hyd. No. 1

Analysis Point 1

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 17 min

Peak discharge = 3.900 cfs
Time to peak = 4.25 hrs
Hyd. volume = 10,200 cuft



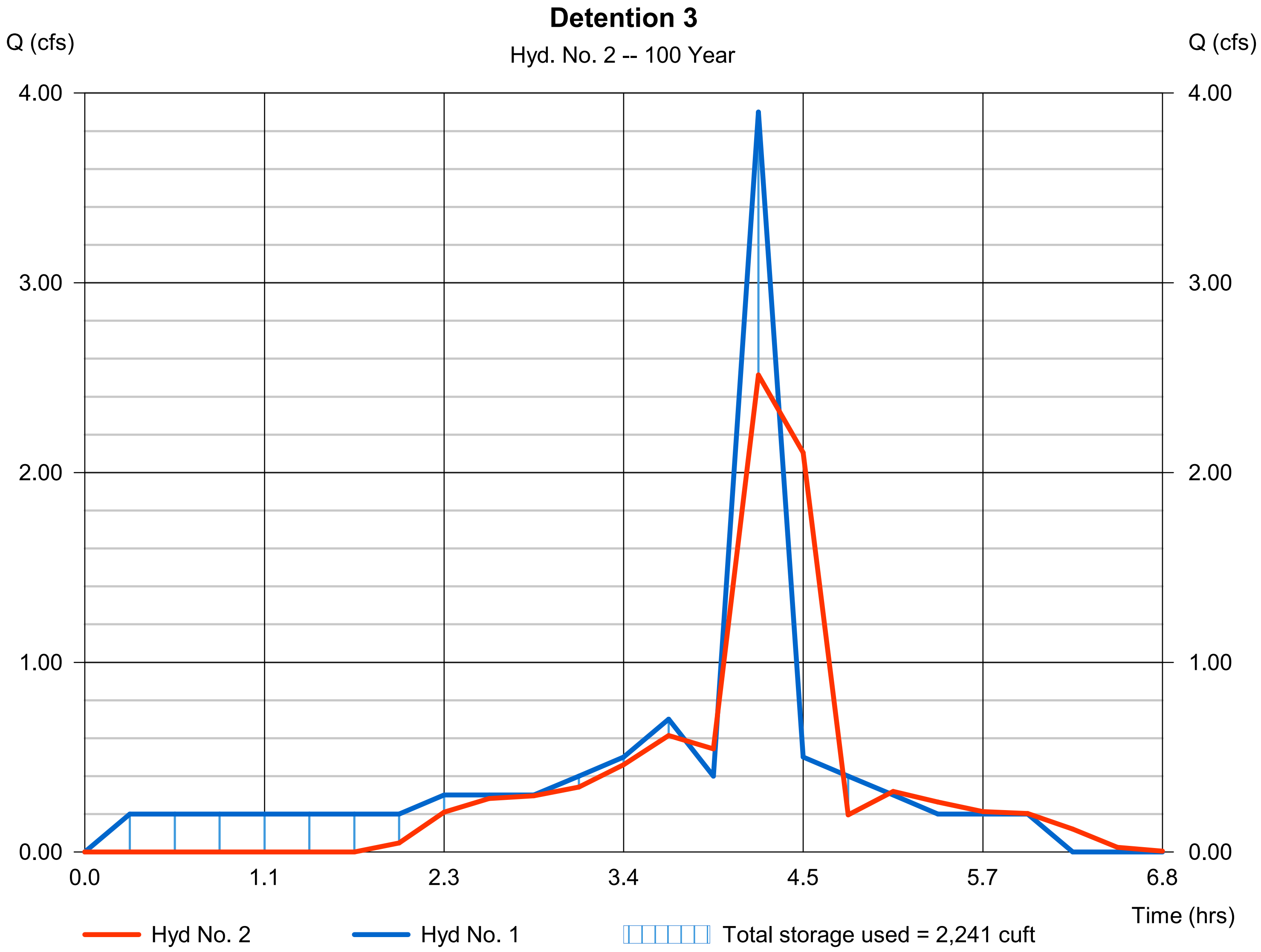
Hydrograph Report

Hyd. No. 2

Detention 3

Hydrograph type	= Reservoir	Peak discharge	= 2.514 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.25 hrs
Time interval	= 17 min	Hyd. volume	= 8,934 cuft
Inflow hyd. No.	= 1 - Analysis Point 1	Max. Elevation	= 205.00 ft
Reservoir name	= bmp #1	Max. Storage	= 2,241 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - bmp #1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	2,000	0	0
1.00	205.00	3,060	2,530	2,530

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	Inactive	Inactive	Inactive
Span (in)	=	18.00	0.90	5.80	24.00
No. Barrels	=	1	1	1	1
Invert El. (ft)	=	202.00	277.67	305.45	48.25
Length (ft)	=	50.00	0.00	0.00	2.00
Slope (%)	=	1.00	0.00	0.00	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	3.14	Inactive	Inactive	Inactive
Crest El. (ft)	=	204.50	304.90	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	1	Rect	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

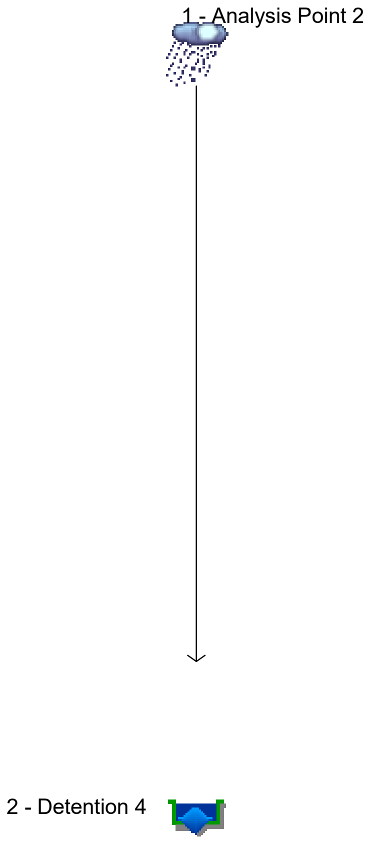
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	2,530	205.00	9.15 oc	0.00	0.00	0.00	2.35 ic	0.00	---	---	---	---	2.345

DETENTION #4 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  7  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  0.4  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  0.79  CFS

TIME (MIN) =  0             DISCHARGE (CFS) =  0
TIME (MIN) =  7             DISCHARGE (CFS) =  0
TIME (MIN) =  14            DISCHARGE (CFS) =  0
TIME (MIN) =  21            DISCHARGE (CFS) =  0
TIME (MIN) =  28            DISCHARGE (CFS) =  0
TIME (MIN) =  35            DISCHARGE (CFS) =  0
TIME (MIN) =  42            DISCHARGE (CFS) =  0
TIME (MIN) =  49            DISCHARGE (CFS) =  0
TIME (MIN) =  56            DISCHARGE (CFS) =  0
TIME (MIN) =  63            DISCHARGE (CFS) =  0
TIME (MIN) =  70            DISCHARGE (CFS) =  0
TIME (MIN) =  77            DISCHARGE (CFS) =  0
TIME (MIN) =  84            DISCHARGE (CFS) =  0
TIME (MIN) =  91            DISCHARGE (CFS) =  0
TIME (MIN) =  98            DISCHARGE (CFS) =  0
TIME (MIN) =  105           DISCHARGE (CFS) =  0
TIME (MIN) =  112           DISCHARGE (CFS) =  0
TIME (MIN) =  119           DISCHARGE (CFS) =  0
TIME (MIN) =  126           DISCHARGE (CFS) =  0
TIME (MIN) =  133           DISCHARGE (CFS) =  0
TIME (MIN) =  140           DISCHARGE (CFS) =  0
TIME (MIN) =  147           DISCHARGE (CFS) =  0
TIME (MIN) =  154           DISCHARGE (CFS) =  0
TIME (MIN) =  161           DISCHARGE (CFS) =  0
TIME (MIN) =  168           DISCHARGE (CFS) =  0
TIME (MIN) =  175           DISCHARGE (CFS) =  0.1
TIME (MIN) =  182           DISCHARGE (CFS) =  0.1
TIME (MIN) =  189           DISCHARGE (CFS) =  0.1
TIME (MIN) =  196           DISCHARGE (CFS) =  0.1
TIME (MIN) =  203           DISCHARGE (CFS) =  0.1
TIME (MIN) =  210           DISCHARGE (CFS) =  0.1
TIME (MIN) =  217           DISCHARGE (CFS) =  0.1
TIME (MIN) =  224           DISCHARGE (CFS) =  0.1
TIME (MIN) =  231           DISCHARGE (CFS) =  0.2
TIME (MIN) =  238           DISCHARGE (CFS) =  0.3
TIME (MIN) =  245           DISCHARGE (CFS) =  0.79
TIME (MIN) =  252           DISCHARGE (CFS) =  0.1
TIME (MIN) =  259           DISCHARGE (CFS) =  0.1
TIME (MIN) =  266           DISCHARGE (CFS) =  0.1
TIME (MIN) =  273           DISCHARGE (CFS) =  0.1
TIME (MIN) =  280           DISCHARGE (CFS) =  0.1
TIME (MIN) =  287           DISCHARGE (CFS) =  0
TIME (MIN) =  294           DISCHARGE (CFS) =  0
TIME (MIN) =  301           DISCHARGE (CFS) =  0
TIME (MIN) =  308           DISCHARGE (CFS) =  0
TIME (MIN) =  315           DISCHARGE (CFS) =  0
TIME (MIN) =  322           DISCHARGE (CFS) =  0
TIME (MIN) =  329           DISCHARGE (CFS) =  0
TIME (MIN) =  336           DISCHARGE (CFS) =  0
TIME (MIN) =  343           DISCHARGE (CFS) =  0
TIME (MIN) =  350           DISCHARGE (CFS) =  0
TIME (MIN) =  357           DISCHARGE (CFS) =  0
TIME (MIN) =  364           DISCHARGE (CFS) =  0
```

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	Analysis Point 2
2	Reservoir	Detention 4

Hydrograph Report

Hyd. No. 1

Analysis Point 2

Hydrograph type	= Manual	Peak discharge	= 0.790 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 1,088 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (hrs	Outflow cfs)
2.92	0.100
3.03	0.100
3.15	0.100
3.27	0.100
3.38	0.100
3.50	0.100
3.62	0.100
3.73	0.100
3.85	0.200
3.97	0.300
4.08	0.790 <<
4.20	0.100
4.32	0.100
4.43	0.100
4.55	0.100
4.67	0.100

...End

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

Hyd. No. 2

Detention 4

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 7 min
Inflow hyd. No. = 1 - Analysis Point 2
Max. Elevation = 204.51 ft

Peak discharge = 0.036 cfs
Time to peak = 4.78 hrs
Hyd. volume = 39 cuft
Reservoir name = bmp #4
Max. Storage = 1,071 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	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
4.67	0.100	204.51	4.420	-----	-----	-----	0.021	-----	-----	-----	-----	0.021
4.78	0.000	204.51 <<	4.420	-----	-----	-----	0.036	-----	-----	-----	-----	0.036 <<
4.90	0.000	204.51	4.420	-----	-----	-----	0.018	-----	-----	-----	-----	0.018
5.02	0.000	204.50	4.420	-----	-----	-----	0.009	-----	-----	-----	-----	0.009
5.13	0.000	204.50	4.420	-----	-----	-----	0.004	-----	-----	-----	-----	0.005
5.25	0.000	204.50	4.420	-----	-----	-----	0.002	-----	-----	-----	-----	0.002
5.37	0.000	204.50	4.420	-----	-----	-----	0.001	-----	-----	-----	-----	0.001

...End

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Tuesday, 08 / 21 / 2018

Pond No. 1 - bmp #4

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	1,670	0	0
1.00	205.00	2,525	2,098	2,098

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	Inactive	Inactive
Span (in)	= 12.00	0.90	5.80	24.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 202.00	277.67	305.45	48.25
Length (ft)	= 50.00	0.00	0.00	2.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	Inactive	Inactive	Inactive
Crest El. (ft)	= 204.50	304.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

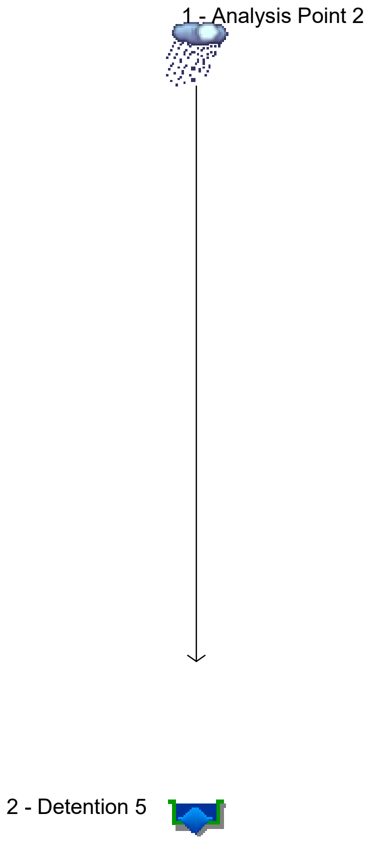
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	2,098	205.00	4.42 oc	0.00	0.00	0.00	2.34 ic	0.00	---	---	---	---	2.343

DETENTION #5 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  6  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  1.32  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  2.75  CFS

TIME (MIN) =  0          DISCHARGE (CFS) =  0
TIME (MIN) =  6          DISCHARGE (CFS) =  0.1
TIME (MIN) =  12         DISCHARGE (CFS) =  0.1
TIME (MIN) =  18         DISCHARGE (CFS) =  0.1
TIME (MIN) =  24         DISCHARGE (CFS) =  0.1
TIME (MIN) =  30         DISCHARGE (CFS) =  0.1
TIME (MIN) =  36         DISCHARGE (CFS) =  0.1
TIME (MIN) =  42         DISCHARGE (CFS) =  0.1
TIME (MIN) =  48         DISCHARGE (CFS) =  0.1
TIME (MIN) =  54         DISCHARGE (CFS) =  0.1
TIME (MIN) =  60         DISCHARGE (CFS) =  0.1
TIME (MIN) =  66         DISCHARGE (CFS) =  0.1
TIME (MIN) =  72         DISCHARGE (CFS) =  0.1
TIME (MIN) =  78         DISCHARGE (CFS) =  0.1
TIME (MIN) =  84         DISCHARGE (CFS) =  0.1
TIME (MIN) =  90         DISCHARGE (CFS) =  0.1
TIME (MIN) =  96         DISCHARGE (CFS) =  0.1
TIME (MIN) =  102        DISCHARGE (CFS) =  0.1
TIME (MIN) =  108        DISCHARGE (CFS) =  0.1
TIME (MIN) =  114        DISCHARGE (CFS) =  0.1
TIME (MIN) =  120        DISCHARGE (CFS) =  0.1
TIME (MIN) =  126        DISCHARGE (CFS) =  0.1
TIME (MIN) =  132        DISCHARGE (CFS) =  0.1
TIME (MIN) =  138        DISCHARGE (CFS) =  0.1
TIME (MIN) =  144        DISCHARGE (CFS) =  0.1
TIME (MIN) =  150        DISCHARGE (CFS) =  0.1
TIME (MIN) =  156        DISCHARGE (CFS) =  0.1
TIME (MIN) =  162        DISCHARGE (CFS) =  0.2
TIME (MIN) =  168        DISCHARGE (CFS) =  0.2
TIME (MIN) =  174        DISCHARGE (CFS) =  0.2
TIME (MIN) =  180        DISCHARGE (CFS) =  0.2
TIME (MIN) =  186        DISCHARGE (CFS) =  0.2
TIME (MIN) =  192        DISCHARGE (CFS) =  0.2
TIME (MIN) =  198        DISCHARGE (CFS) =  0.2
TIME (MIN) =  204        DISCHARGE (CFS) =  0.2
TIME (MIN) =  210        DISCHARGE (CFS) =  0.3
TIME (MIN) =  216        DISCHARGE (CFS) =  0.3
TIME (MIN) =  222        DISCHARGE (CFS) =  0.4
TIME (MIN) =  228        DISCHARGE (CFS) =  0.4
TIME (MIN) =  234        DISCHARGE (CFS) =  0.6
TIME (MIN) =  240        DISCHARGE (CFS) =  1.2
TIME (MIN) =  246        DISCHARGE (CFS) =  2.75
TIME (MIN) =  252        DISCHARGE (CFS) =  0.5
TIME (MIN) =  258        DISCHARGE (CFS) =  0.3
TIME (MIN) =  264        DISCHARGE (CFS) =  0.3
TIME (MIN) =  270        DISCHARGE (CFS) =  0.2
TIME (MIN) =  276        DISCHARGE (CFS) =  0.2
TIME (MIN) =  282        DISCHARGE (CFS) =  0.2
TIME (MIN) =  288        DISCHARGE (CFS) =  0.2
TIME (MIN) =  294        DISCHARGE (CFS) =  0.1
TIME (MIN) =  300        DISCHARGE (CFS) =  0.1
TIME (MIN) =  306        DISCHARGE (CFS) =  0.1
TIME (MIN) =  312        DISCHARGE (CFS) =  0.1
TIME (MIN) =  318        DISCHARGE (CFS) =  0.1
TIME (MIN) =  324        DISCHARGE (CFS) =  0.1
TIME (MIN) =  330        DISCHARGE (CFS) =  0.1
TIME (MIN) =  336        DISCHARGE (CFS) =  0.1
TIME (MIN) =  342        DISCHARGE (CFS) =  0.1
TIME (MIN) =  348        DISCHARGE (CFS) =  0.1
TIME (MIN) =  354        DISCHARGE (CFS) =  0.1
TIME (MIN) =  360        DISCHARGE (CFS) =  0.1
TIME (MIN) =  366        DISCHARGE (CFS) =  0
```

Watershed Model Schematic



Legend

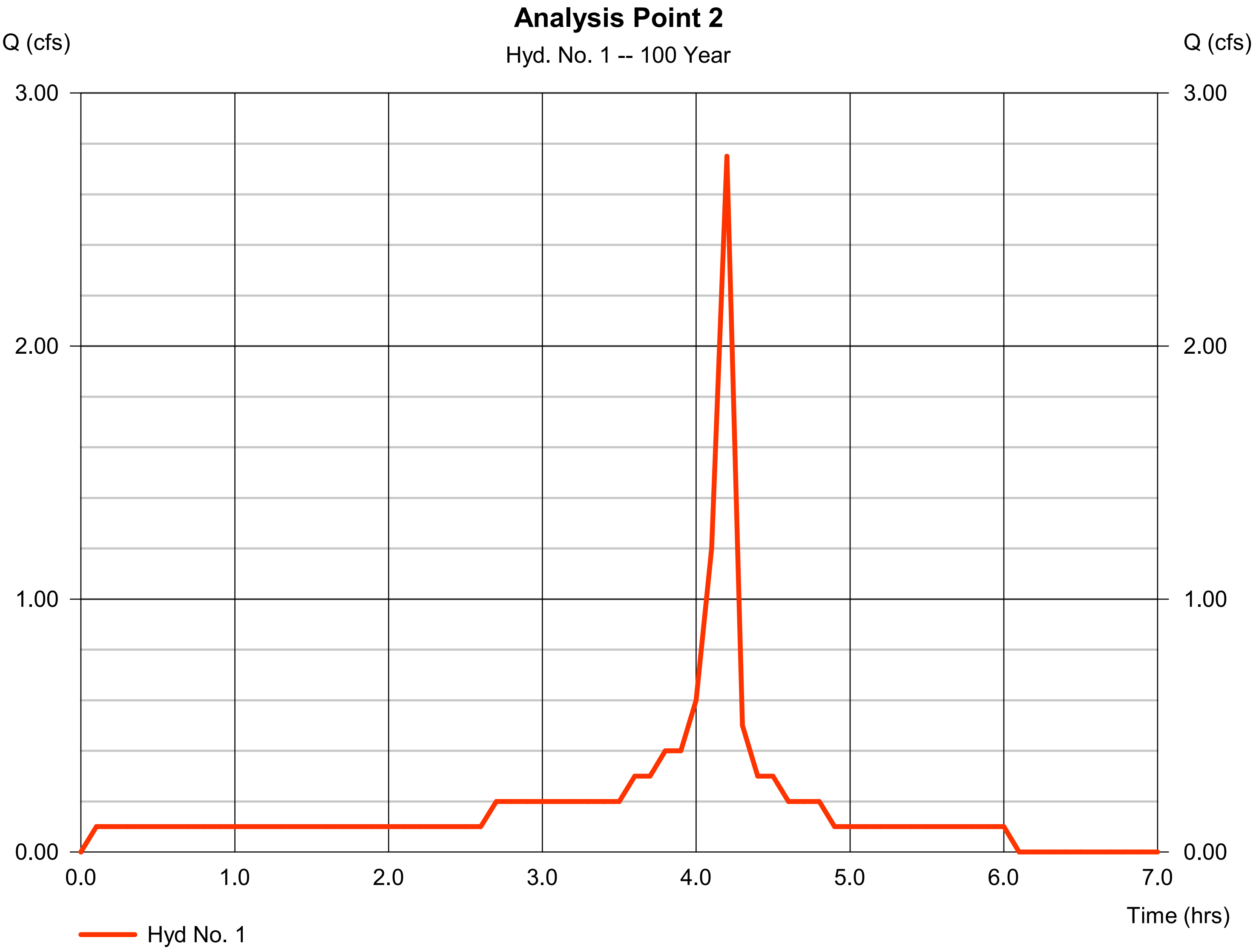
Hyd.	Origin	Description
1	Manual	Analysis Point 2
2	Reservoir	Detention 5

Hydrograph Report

Hyd. No. 1

Analysis Point 2

Hydrograph type	= Manual	Peak discharge	= 2.750 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.20 hrs
Time interval	= 6 min	Hyd. volume	= 4,770 cuft



Hydrograph Report

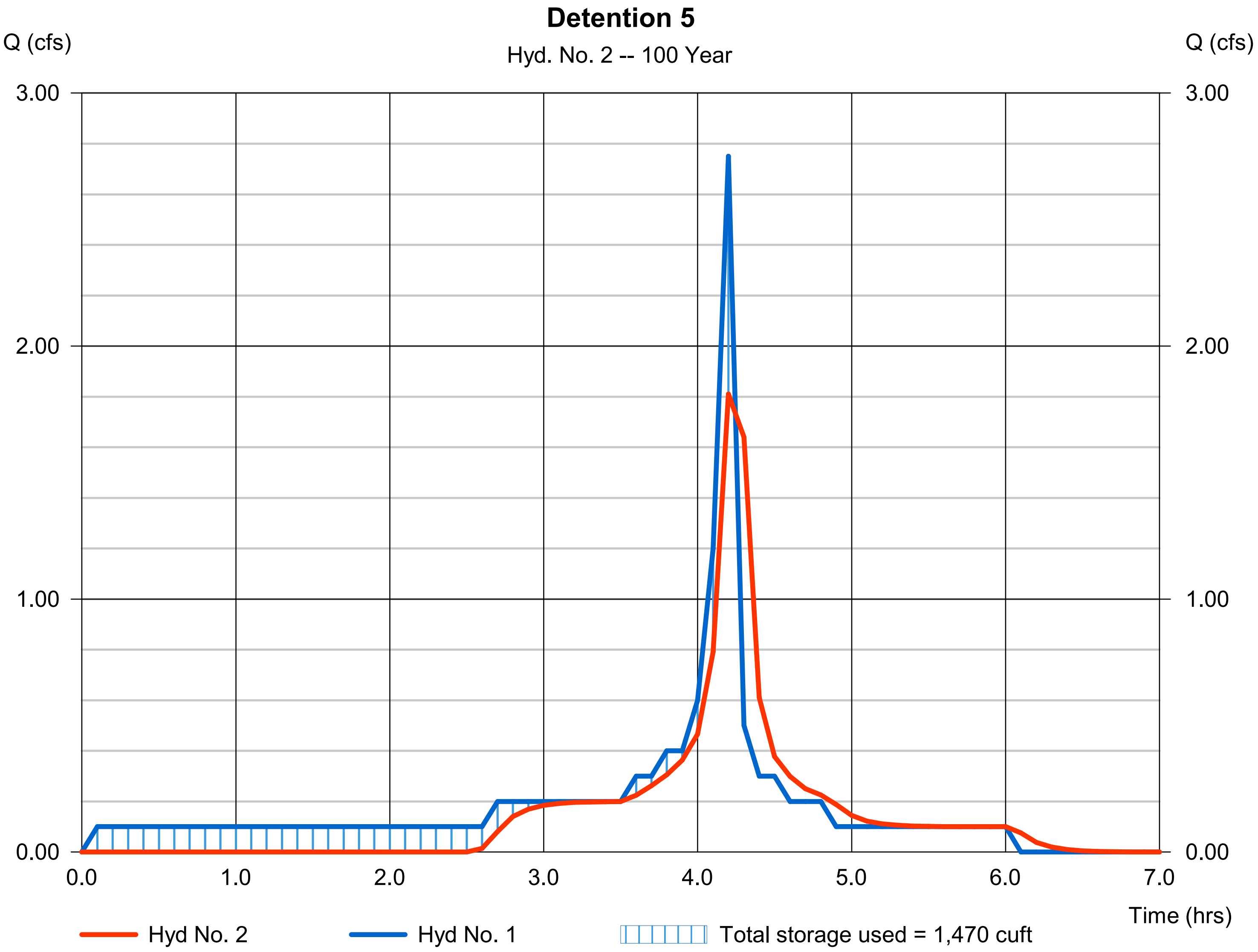
Hyd. No. 2

Detention 5

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 6 min
Inflow hyd. No. = 1 - Analysis Point 2
Reservoir name = bmp #5

Peak discharge = 1.810 cfs
Time to peak = 4.20 hrs
Hyd. volume = 3,862 cuft
Max. Elevation = 204.90 ft
Max. Storage = 1,470 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - bmp #5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	1,550	0	0
1.00	205.00	2,080	1,815	1,815

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	Inactive	Inactive
Span (in)	= 12.00	0.90	5.80	24.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 202.00	277.67	305.45	48.25
Length (ft)	= 50.00	0.00	0.00	2.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	Inactive	Inactive	Inactive
Crest El. (ft)	= 204.50	304.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

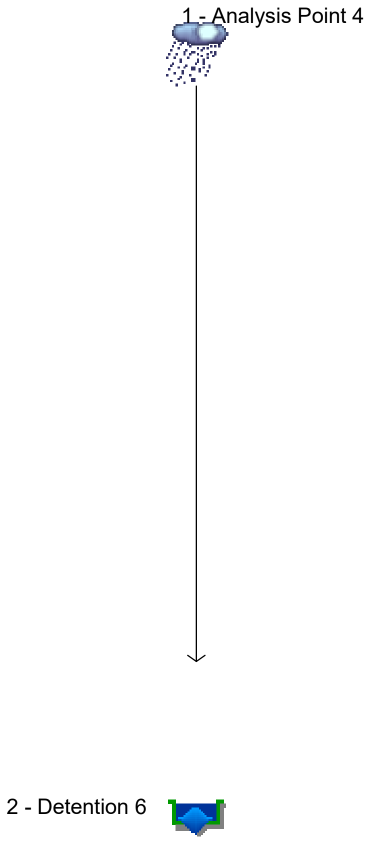
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	1,815	205.00	4.42 oc	0.00	0.00	0.00	2.34 ic	0.00	---	---	---	---	2.343

DETENTION #6 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  7  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  1.61  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  3.1  CFS

TIME (MIN) =  0         DISCHARGE (CFS) =  0
TIME (MIN) =  7         DISCHARGE (CFS) =  0.1
TIME (MIN) =  14        DISCHARGE (CFS) =  0.1
TIME (MIN) =  21        DISCHARGE (CFS) =  0.1
TIME (MIN) =  28        DISCHARGE (CFS) =  0.1
TIME (MIN) =  35        DISCHARGE (CFS) =  0.1
TIME (MIN) =  42        DISCHARGE (CFS) =  0.1
TIME (MIN) =  49        DISCHARGE (CFS) =  0.1
TIME (MIN) =  56        DISCHARGE (CFS) =  0.1
TIME (MIN) =  63        DISCHARGE (CFS) =  0.1
TIME (MIN) =  70        DISCHARGE (CFS) =  0.1
TIME (MIN) =  77        DISCHARGE (CFS) =  0.1
TIME (MIN) =  84        DISCHARGE (CFS) =  0.1
TIME (MIN) =  91        DISCHARGE (CFS) =  0.1
TIME (MIN) =  98        DISCHARGE (CFS) =  0.1
TIME (MIN) =  105       DISCHARGE (CFS) =  0.1
TIME (MIN) =  112       DISCHARGE (CFS) =  0.1
TIME (MIN) =  119       DISCHARGE (CFS) =  0.1
TIME (MIN) =  126       DISCHARGE (CFS) =  0.2
TIME (MIN) =  133       DISCHARGE (CFS) =  0.2
TIME (MIN) =  140       DISCHARGE (CFS) =  0.2
TIME (MIN) =  147       DISCHARGE (CFS) =  0.2
TIME (MIN) =  154       DISCHARGE (CFS) =  0.2
TIME (MIN) =  161       DISCHARGE (CFS) =  0.2
TIME (MIN) =  168       DISCHARGE (CFS) =  0.2
TIME (MIN) =  175       DISCHARGE (CFS) =  0.2
TIME (MIN) =  182       DISCHARGE (CFS) =  0.2
TIME (MIN) =  189       DISCHARGE (CFS) =  0.3
TIME (MIN) =  196       DISCHARGE (CFS) =  0.3
TIME (MIN) =  203       DISCHARGE (CFS) =  0.3
TIME (MIN) =  210       DISCHARGE (CFS) =  0.3
TIME (MIN) =  217       DISCHARGE (CFS) =  0.4
TIME (MIN) =  224       DISCHARGE (CFS) =  0.5
TIME (MIN) =  231       DISCHARGE (CFS) =  0.7
TIME (MIN) =  238       DISCHARGE (CFS) =  1.3
TIME (MIN) =  245       DISCHARGE (CFS) =  3.1
TIME (MIN) =  252       DISCHARGE (CFS) =  0.5
TIME (MIN) =  259       DISCHARGE (CFS) =  0.4
TIME (MIN) =  266       DISCHARGE (CFS) =  0.3
TIME (MIN) =  273       DISCHARGE (CFS) =  0.2
TIME (MIN) =  280       DISCHARGE (CFS) =  0.2
TIME (MIN) =  287       DISCHARGE (CFS) =  0.2
TIME (MIN) =  294       DISCHARGE (CFS) =  0.2
TIME (MIN) =  301       DISCHARGE (CFS) =  0.2
TIME (MIN) =  308       DISCHARGE (CFS) =  0.1
TIME (MIN) =  315       DISCHARGE (CFS) =  0.1
TIME (MIN) =  322       DISCHARGE (CFS) =  0.1
TIME (MIN) =  329       DISCHARGE (CFS) =  0.1
TIME (MIN) =  336       DISCHARGE (CFS) =  0.1
TIME (MIN) =  343       DISCHARGE (CFS) =  0.1
TIME (MIN) =  350       DISCHARGE (CFS) =  0.1
TIME (MIN) =  357       DISCHARGE (CFS) =  0.1
TIME (MIN) =  364       DISCHARGE (CFS) =  0
```

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	Analysis Point 4
2	Reservoir	Detention 6

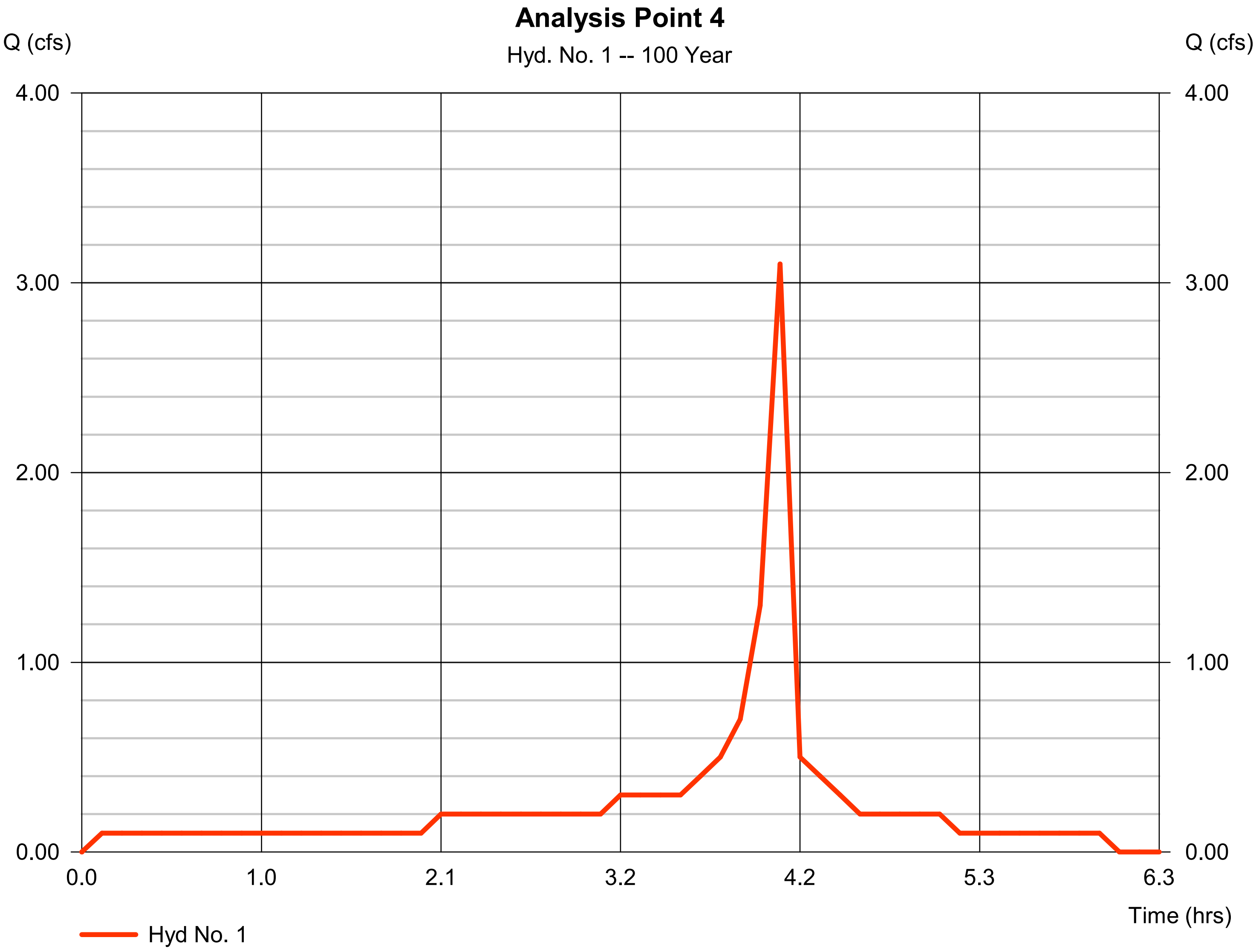
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

Hyd. No. 1

Analysis Point 4

Hydrograph type	= Manual	Peak discharge	= 3.100 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 5,754 cuft



Hydrograph Report

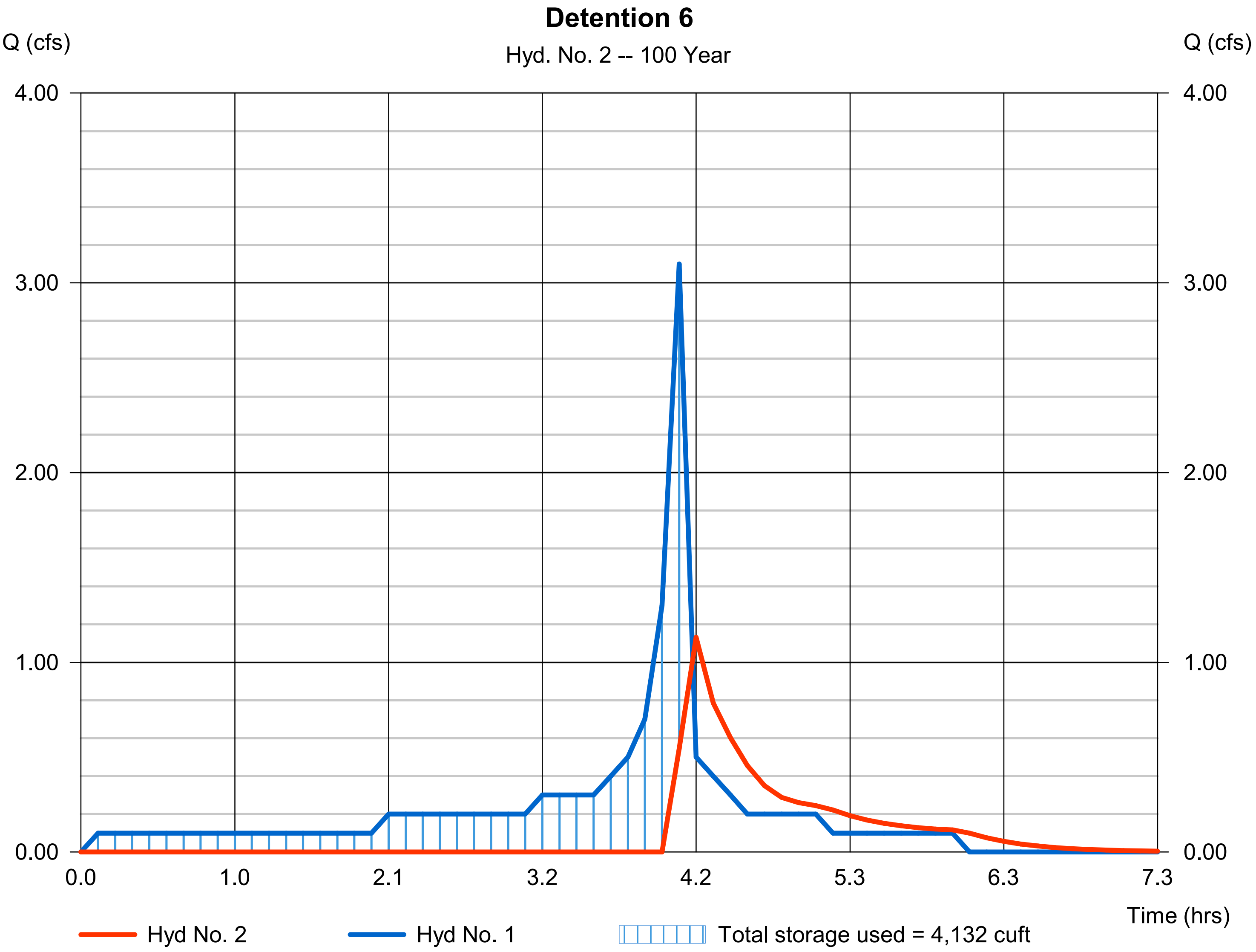
Hyd. No. 2

Detention 6

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 7 min
Inflow hyd. No. = 1 - Analysis Point 4
Reservoir name = bmp #6

Peak discharge = 1.131 cfs
Time to peak = 4.20 hrs
Hyd. volume = 2,642 cuft
Max. Elevation = 205.29 ft
Max. Storage = 4,132 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12 Tuesday, 08 / 21 / 2018

Pond No. 1 - bmp #6

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	2,740	0	0
1.00	205.00	3,480	3,110	3,110
2.00	206.00	4,540	4,010	7,120

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	Inactive	Inactive	Inactive
Span (in)	= 10.00	0.90	5.80	24.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 202.00	277.67	305.45	48.25
Length (ft)	= 50.00	0.00	0.00	2.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.60	Inactive	Inactive	Inactive
Crest El. (ft)	= 205.00	304.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

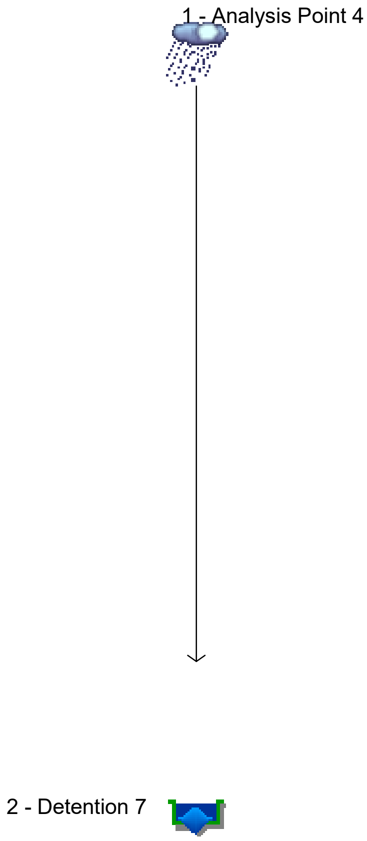
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	3,110	205.00	3.03 oc	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
2.00	7,120	206.00	3.03 oc	0.00	0.00	0.00	2.27 ic	0.00	---	---	---	---	2.272

DETENTION #7 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/20/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  8  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  1.08  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  2.02  CFS

TIME (MIN) =  0              DISCHARGE (CFS) =  0
TIME (MIN) =  8              DISCHARGE (CFS) =  0.1
TIME (MIN) =  16             DISCHARGE (CFS) =  0.1
TIME (MIN) =  24             DISCHARGE (CFS) =  0.1
TIME (MIN) =  32             DISCHARGE (CFS) =  0.1
TIME (MIN) =  40             DISCHARGE (CFS) =  0.1
TIME (MIN) =  48             DISCHARGE (CFS) =  0.1
TIME (MIN) =  56             DISCHARGE (CFS) =  0.1
TIME (MIN) =  64             DISCHARGE (CFS) =  0.1
TIME (MIN) =  72             DISCHARGE (CFS) =  0.1
TIME (MIN) =  80             DISCHARGE (CFS) =  0.1
TIME (MIN) =  88             DISCHARGE (CFS) =  0.1
TIME (MIN) =  96             DISCHARGE (CFS) =  0.1
TIME (MIN) =  104            DISCHARGE (CFS) =  0.1
TIME (MIN) =  112            DISCHARGE (CFS) =  0.1
TIME (MIN) =  120            DISCHARGE (CFS) =  0.1
TIME (MIN) =  128            DISCHARGE (CFS) =  0.1
TIME (MIN) =  136            DISCHARGE (CFS) =  0.1
TIME (MIN) =  144            DISCHARGE (CFS) =  0.1
TIME (MIN) =  152            DISCHARGE (CFS) =  0.1
TIME (MIN) =  160            DISCHARGE (CFS) =  0.1
TIME (MIN) =  168            DISCHARGE (CFS) =  0.1
TIME (MIN) =  176            DISCHARGE (CFS) =  0.1
TIME (MIN) =  184            DISCHARGE (CFS) =  0.2
TIME (MIN) =  192            DISCHARGE (CFS) =  0.2
TIME (MIN) =  200            DISCHARGE (CFS) =  0.2
TIME (MIN) =  208            DISCHARGE (CFS) =  0.2
TIME (MIN) =  216            DISCHARGE (CFS) =  0.2
TIME (MIN) =  224            DISCHARGE (CFS) =  0.3
TIME (MIN) =  232            DISCHARGE (CFS) =  0.4
TIME (MIN) =  240            DISCHARGE (CFS) =  0.7
TIME (MIN) =  248            DISCHARGE (CFS) =  2.02
TIME (MIN) =  256            DISCHARGE (CFS) =  0.3
TIME (MIN) =  264            DISCHARGE (CFS) =  0.2
TIME (MIN) =  272            DISCHARGE (CFS) =  0.2
TIME (MIN) =  280            DISCHARGE (CFS) =  0.1
TIME (MIN) =  288            DISCHARGE (CFS) =  0.1
TIME (MIN) =  296            DISCHARGE (CFS) =  0.1
TIME (MIN) =  304            DISCHARGE (CFS) =  0.1
TIME (MIN) =  312            DISCHARGE (CFS) =  0.1
TIME (MIN) =  320            DISCHARGE (CFS) =  0.1
TIME (MIN) =  328            DISCHARGE (CFS) =  0.1
TIME (MIN) =  336            DISCHARGE (CFS) =  0.1
TIME (MIN) =  344            DISCHARGE (CFS) =  0.1
TIME (MIN) =  352            DISCHARGE (CFS) =  0.1
TIME (MIN) =  360            DISCHARGE (CFS) =  0.1
TIME (MIN) =  368            DISCHARGE (CFS) =  0
```

Watershed Model Schematic



Legend

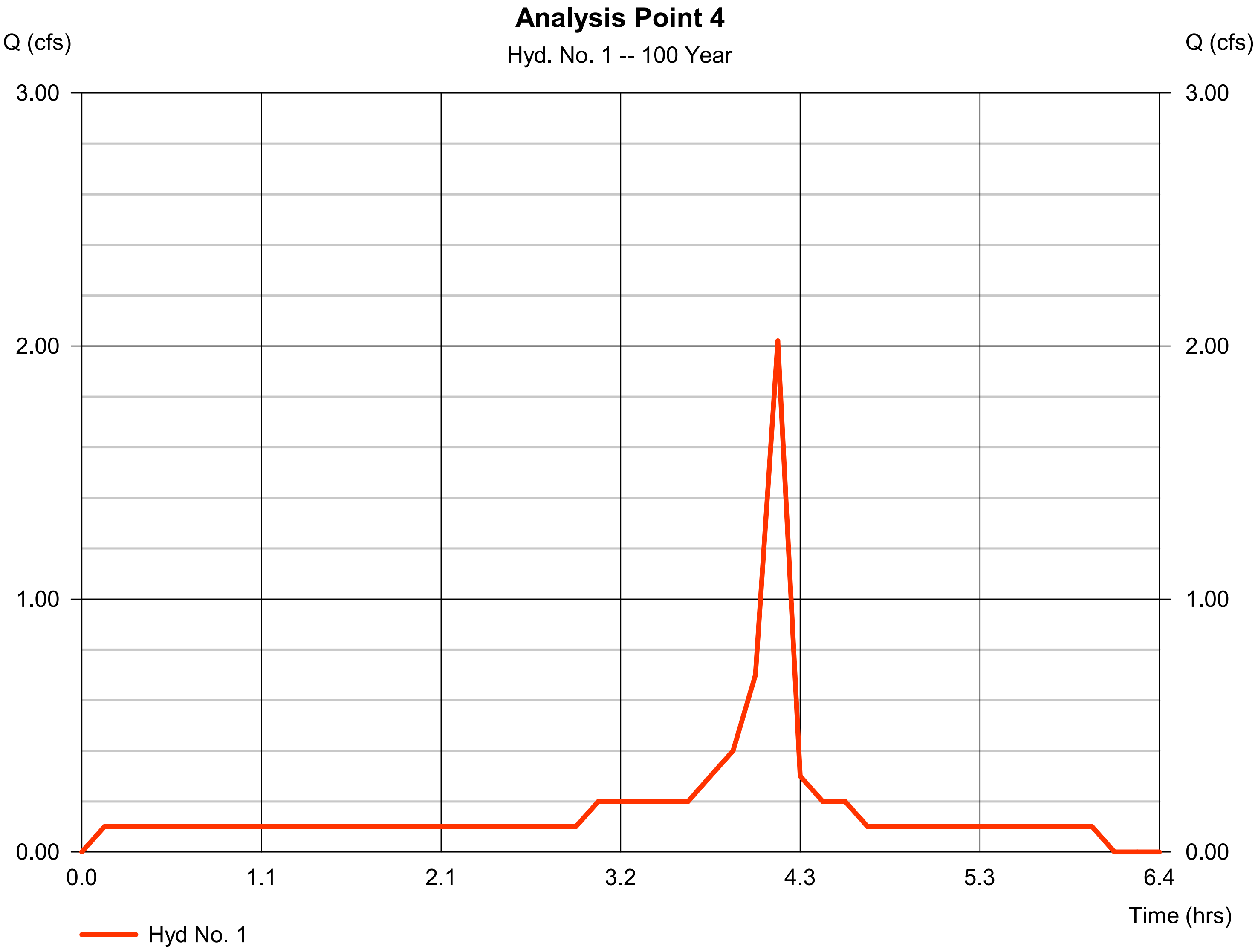
Hyd.	Origin	Description
1	Manual	Analysis Point 4
2	Reservoir	Detention 7

Hydrograph Report

Hyd. No. 1

Analysis Point 4

Hydrograph type	= Manual	Peak discharge	= 2.020 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.13 hrs
Time interval	= 8 min	Hyd. volume	= 4,042 cuft



Hydrograph Report

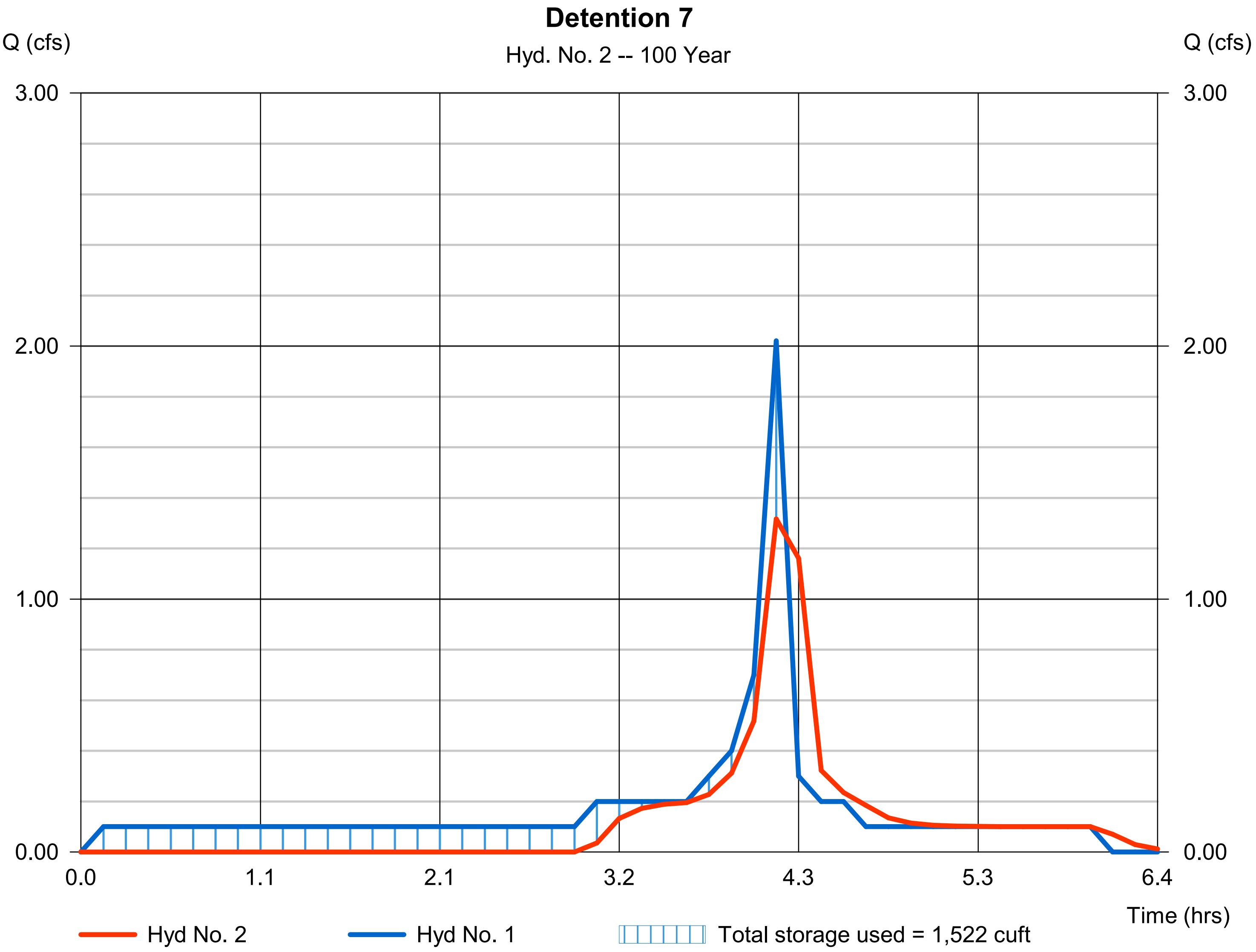
Hyd. No. 2

Detention 7

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 8 min
Inflow hyd. No. = 1 - Analysis Point 4
Reservoir name = bmp #7

Peak discharge = 1.317 cfs
Time to peak = 4.13 hrs
Hyd. volume = 2,966 cuft
Max. Elevation = 205.39 ft
Max. Storage = 1,522 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - bmp #7

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 204.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	840	0	0
1.00	205.00	1,310	1,075	1,075
2.00	206.00	1,840	1,575	2,650

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	Inactive	Inactive	Inactive
Span (in)	= 10.00	0.90	5.80	24.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 202.00	277.67	305.45	48.25
Length (ft)	= 50.00	0.00	0.00	2.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.60	Inactive	Inactive	Inactive
Crest El. (ft)	= 205.00	304.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

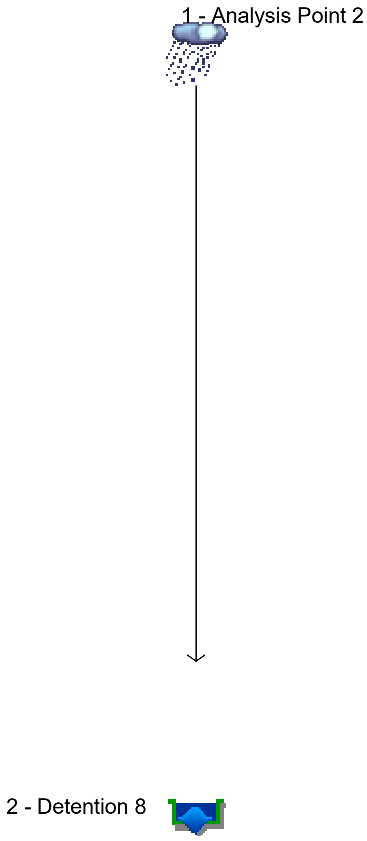
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	1,075	205.00	3.03 oc	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
2.00	2,650	206.00	3.03 oc	0.00	0.00	0.00	2.27 ic	0.00	---	---	---	---	2.272

DETENTION #8 ANALYSIS

```
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE   8/21/2018
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION  7  MIN.
6 HOUR RAINFALL  2  INCHES
BASIN AREA  1.07  ACRES
RUNOFF COEFFICIENT  0.5
PEAK DISCHARGE  2.12  CFS

TIME (MIN) =  0        DISCHARGE (CFS) =  0
TIME (MIN) =  7        DISCHARGE (CFS) =  0.1
TIME (MIN) =  14       DISCHARGE (CFS) =  0.1
TIME (MIN) =  21       DISCHARGE (CFS) =  0.1
TIME (MIN) =  28       DISCHARGE (CFS) =  0.1
TIME (MIN) =  35       DISCHARGE (CFS) =  0.1
TIME (MIN) =  42       DISCHARGE (CFS) =  0.1
TIME (MIN) =  49       DISCHARGE (CFS) =  0.1
TIME (MIN) =  56       DISCHARGE (CFS) =  0.1
TIME (MIN) =  63       DISCHARGE (CFS) =  0.1
TIME (MIN) =  70       DISCHARGE (CFS) =  0.1
TIME (MIN) =  77       DISCHARGE (CFS) =  0.1
TIME (MIN) =  84       DISCHARGE (CFS) =  0.1
TIME (MIN) =  91       DISCHARGE (CFS) =  0.1
TIME (MIN) =  98       DISCHARGE (CFS) =  0.1
TIME (MIN) =  105      DISCHARGE (CFS) =  0.1
TIME (MIN) =  112      DISCHARGE (CFS) =  0.1
TIME (MIN) =  119      DISCHARGE (CFS) =  0.1
TIME (MIN) =  126      DISCHARGE (CFS) =  0.1
TIME (MIN) =  133      DISCHARGE (CFS) =  0.1
TIME (MIN) =  140      DISCHARGE (CFS) =  0.1
TIME (MIN) =  147      DISCHARGE (CFS) =  0.1
TIME (MIN) =  154      DISCHARGE (CFS) =  0.1
TIME (MIN) =  161      DISCHARGE (CFS) =  0.1
TIME (MIN) =  168      DISCHARGE (CFS) =  0.1
TIME (MIN) =  175      DISCHARGE (CFS) =  0.1
TIME (MIN) =  182      DISCHARGE (CFS) =  0.2
TIME (MIN) =  189      DISCHARGE (CFS) =  0.2
TIME (MIN) =  196      DISCHARGE (CFS) =  0.2
TIME (MIN) =  203      DISCHARGE (CFS) =  0.2
TIME (MIN) =  210      DISCHARGE (CFS) =  0.2
TIME (MIN) =  217      DISCHARGE (CFS) =  0.3
TIME (MIN) =  224      DISCHARGE (CFS) =  0.3
TIME (MIN) =  231      DISCHARGE (CFS) =  0.4
TIME (MIN) =  238      DISCHARGE (CFS) =  0.8
TIME (MIN) =  245      DISCHARGE (CFS) =  2.12
TIME (MIN) =  252      DISCHARGE (CFS) =  0.4
TIME (MIN) =  259      DISCHARGE (CFS) =  0.2
TIME (MIN) =  266      DISCHARGE (CFS) =  0.2
TIME (MIN) =  273      DISCHARGE (CFS) =  0.2
TIME (MIN) =  280      DISCHARGE (CFS) =  0.1
TIME (MIN) =  287      DISCHARGE (CFS) =  0.1
TIME (MIN) =  294      DISCHARGE (CFS) =  0.1
TIME (MIN) =  301      DISCHARGE (CFS) =  0.1
TIME (MIN) =  308      DISCHARGE (CFS) =  0.1
TIME (MIN) =  315      DISCHARGE (CFS) =  0.1
TIME (MIN) =  322      DISCHARGE (CFS) =  0.1
TIME (MIN) =  329      DISCHARGE (CFS) =  0.1
TIME (MIN) =  336      DISCHARGE (CFS) =  0.1
TIME (MIN) =  343      DISCHARGE (CFS) =  0.1
TIME (MIN) =  350      DISCHARGE (CFS) =  0.1
TIME (MIN) =  357      DISCHARGE (CFS) =  0.1
TIME (MIN) =  364      DISCHARGE (CFS) =  0
```

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12



Legend

Hyd.	Origin	Description
1	Manual	Analysis Point 2
2	Reservoir	Detention 8

Project: Det-8 YR 100.gpw

Tuesday, 08 / 21 / 2018

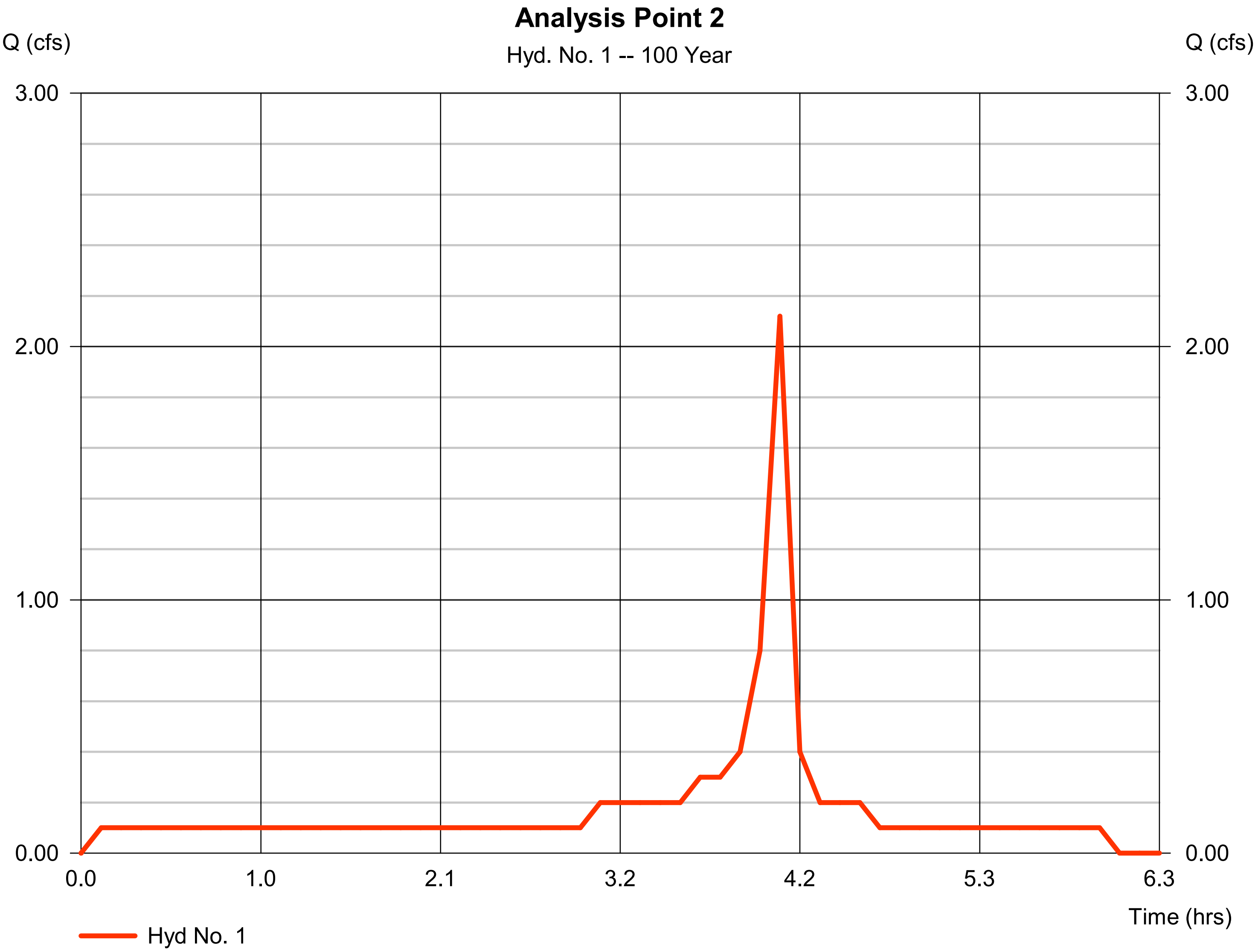
Hydrograph Report

Hyd. No. 1

Analysis Point 2

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 7 min

Peak discharge = 2.120 cfs
Time to peak = 4.08 hrs
Hyd. volume = 4,040 cuft



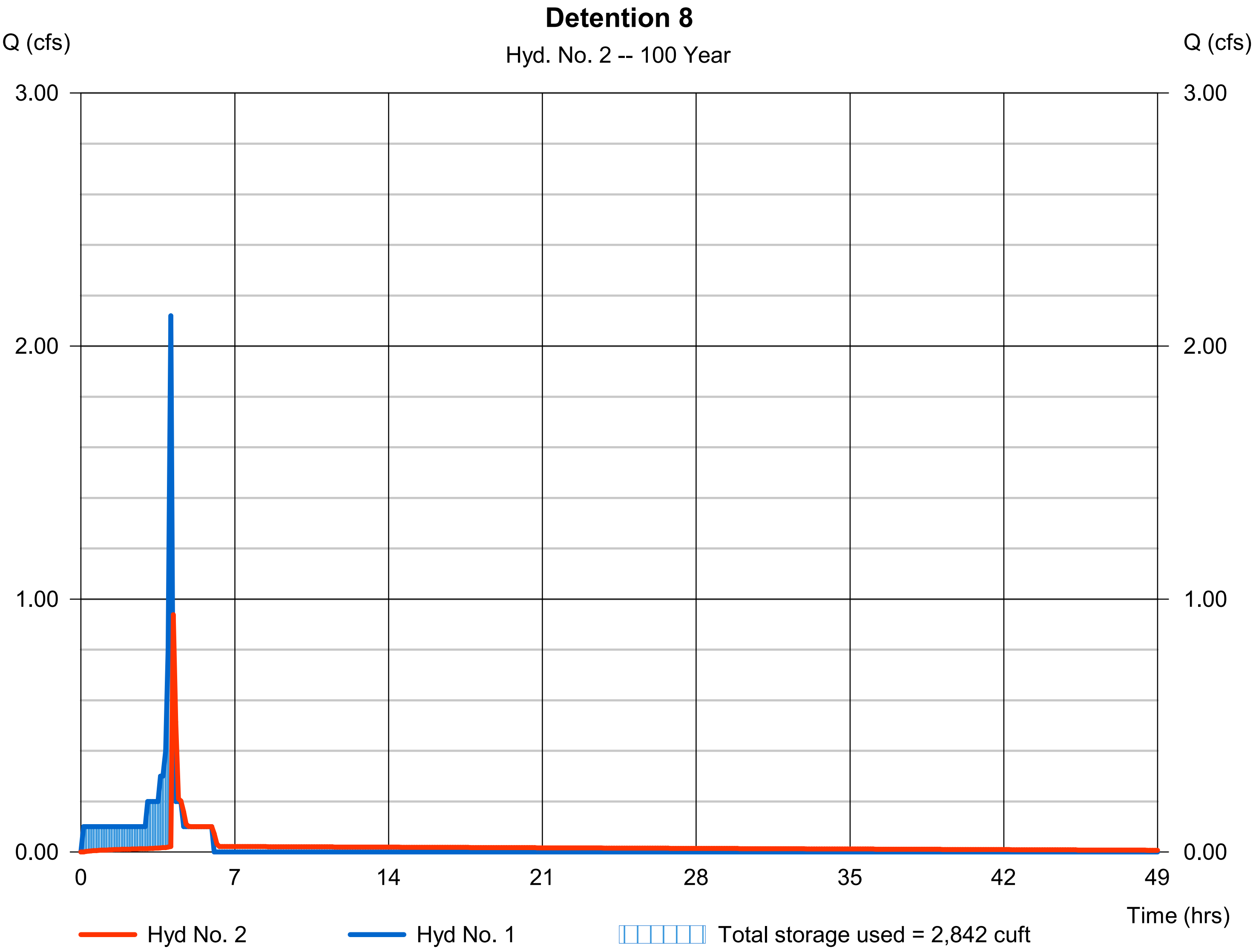
Hydrograph Report

Hyd. No. 2

Detention 8

Hydrograph type	= Reservoir	Peak discharge	= 0.938 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.20 hrs
Time interval	= 7 min	Hyd. volume	= 4,016 cuft
Inflow hyd. No.	= 1 - Analysis Point 2	Max. Elevation	= 207.50 ft
Reservoir name	= bmp #9	Max. Storage	= 2,842 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - bmp #9

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	204.00	n/a	0	0
1.00	205.00	n/a	840	840
2.00	206.00	n/a	840	1,680
3.00	207.00	n/a	840	2,520
3.50	207.50	n/a	420	2,940

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.70	Inactive	Inactive
Span (in)	= 8.00	0.70	5.80	24.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 204.00	204.00	305.45	48.25
Length (ft)	= 20.00	0.00	0.00	2.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.10	Inactive	Inactive	Inactive
Crest El. (ft)	= 207.00	304.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	204.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
1.00	840	205.00	0.01 ic	0.01 ic	0.00	0.00	0.00	0.00	---	---	---	---	0.012
2.00	1,680	206.00	0.02 ic	0.02 ic	0.00	0.00	0.00	0.00	---	---	---	---	0.018
3.00	2,520	207.00	0.02 ic	0.02 ic	0.00	0.00	0.00	0.00	---	---	---	---	0.022
3.50	2,940	207.50	1.07 ic	0.02 ic	0.00	0.00	1.05 ic	0.00	---	---	---	---	1.069

APPENDIX E:

Excerpts from Drainage Design Manual

Chapter

2

Hydrology

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

2.1. Discharge Flow Methods

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

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

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

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

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

2.2. Design Storm Frequency

Design storm frequency shall be based upon the following criteria:

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

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

2.3. Soil Type

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

2.4. Other Requirements

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

2.5. Water Quality Considerations

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

Appendix A

Rational Method and Modified Rational Method

A.1. Rational Method (RM)

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

A.1.1. Rational Method Formula

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

Equation A-1. RM Formula Expression

$$Q = C\,I\,A$$

where:

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

C = runoff coefficient expressed as that percentage of rainfall which becomes surface runoff (no units); Refer to Appendix A.1.2

I = average rainfall intensity for a storm duration equal to the time of concetrnatation (T_c) of the contributing draiange area, in inches per hour; Refer to Appendix A.1.3 and Appendix A.1.4

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

Combining the units for the expression CIA yields:

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

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

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

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

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

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

A.1.2. Runoff Coefficient

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

Table A-1. Runoff Coefficients for Rational Method

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

Note:

(1) Type D soil to be used for all areas.

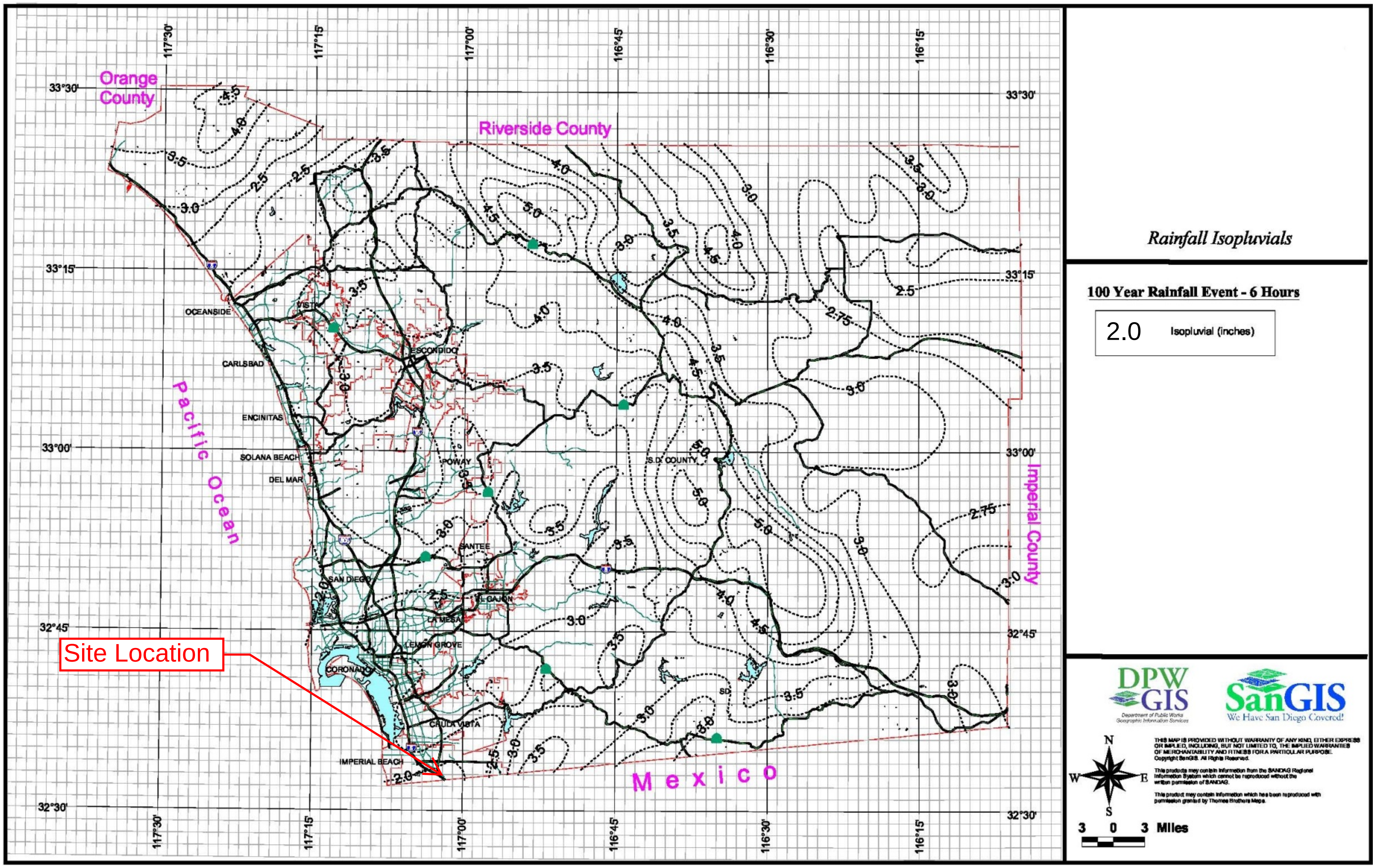
(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be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

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

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

A.1.3. Rainfall Intensity

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



THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

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

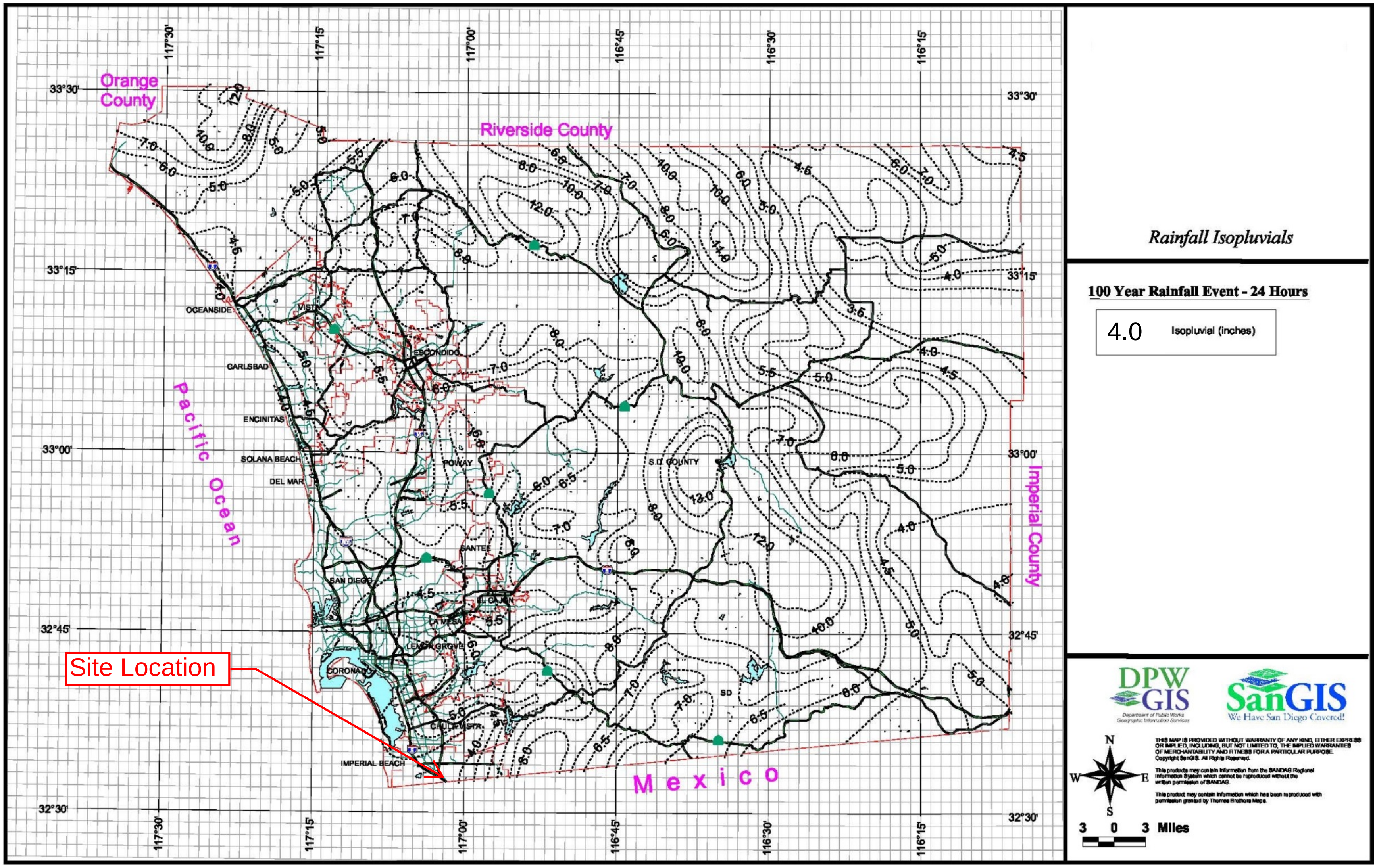


Figure B-3. 100-Year 24-Hour Isopluvials

APPENDIX F:

FEMA Flood Plain Map

National Flood Hazard Layer FIRMette

FEMA

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	🟦	Without Base Flood Elevation (BFE) *Zone A, V, A99* With BFE or Depth *Zone AE, AO, AH, VE, AR*
	▨	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	🟧	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	▨	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	▨	Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
	▨	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN	Area of Minimal Flood Hazard *Zone X*
	▭	Effective LOMRs
	▭	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	— — —	Channel, Culvert, or Storm Sewer
	ꞁꞁꞁꞁꞁꞁꞁ	Levee, Dike, or Floodwall
OTHER FEATURES	Ⓑ 20.2 / 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	⑧ — —	Coastal Transect
	~~ 513 ~~~	Base Flood Elevation Line (BFE)
	═	Limit of Study
	═	Jurisdiction Boundary
	— - —	Coastal Transect Baseline
	- —	Profile Baseline
	—	Hydrographic Feature
MAP PANELS	☐	Digital Data Available
	☐	No Digital Data Available
	☒	Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/20/2018 at 6:45:34 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Attachment 6
Geotechnical and Groundwater Investigation Report

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

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

DESKTOP

GEOTECHNICAL INVESTIGATION

BEYER COMMUNITY PARK

BEYER BOULEVARD AND ENRIGHT DRIVE

SAN DIEGO, CALIFORNIA

Prepared for:

Schmidt Design Group

(K2 Engineering Job No. G2017001-1)

March 22, 2017

K2 ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

K2 ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

March 22, 2017

Ms. Jennifer Montgomery
Schmidt Design Group
2655 Fourth Avenue
San Diego, California 92103

Transmitted via e-mail: JMontgomery@schmidtdesign.com

Subject: **Desktop – Geotechnical Investigation**
Proposed Beyer Community Park
Beyer Boulevard and Enright Drive
San Diego, California
K2 Engineering Job No. G2017001-1

Dear Ms. Montgomery:

We are pleased to present our "Desktop Geotechnical Investigation, Beyer Community Park, Beyer Boulevard and Enright Drive, San Diego, California".

The purpose of this investigation was to review available information on the geotechnical conditions that may exist at the site of the proposed Beyer Community Park and to provide an opinion regarding the geologic hazards and preliminary design considerations for the planned facility.

Please call us if you have any questions or if we can be of further service to you on this or future projects. It has been a pleasure working with you.

Respectfully submitted,

K2 ENGINEERING, INC.

Susana C-Kemmerer

Susana Kemmerer, GE 2287
President
K2 Engineering, Inc.

REGISTERED PROFESSIONAL ENGINEER
SUSANA KEMMERER
No. 2287
Exp. 6/30/17
GEOTECHNICAL
STATE OF CALIFORNIA

Michael W. Hart, CEG 706
Engineering Geologist
Consultant

REGISTERED GEOLOGIST
MICHAEL W. HART
NO. CEG706
CERTIFIED ENGINEERING GEOLOGIST
EXP. 10/31/18
STATE OF CALIFORNIA

K2\REPORTS\Schmidt Design\Beyer Park\G2017001-1 Beyer Park Desktop FINAL.doc

K2 ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

DESKTOP
GEOTECHNICAL INVESTIGATION
BEYER COMMUNITY PARK
BEYER BOULEVARD AND ENRIGHT DRIVE
SAN DIEGO, CALIFORNIA

Prepared for:

Schmidt Design Group

(K2 Engineering Job No. G2017001-1)

TABLE OF CONTENTS

Text **Page No.**

1.0 Summary 1
2.0 Scope of Investigation 3
3.0 Project Description 4
4.0 Information Review 4
  4.1 Reports by Others 4
  4.2 Aerial Photographic Review 5
5.0 Site Conditions 7
  5.1 Site Reconnaissance 7
  5.2 Existing Conditions 9
  5.3 Geologic Setting 9
  5.4 Subsurface Conditions 9
  5.5 Geologic Hazards 12
6.0 Conclusions and Recommendations 16
  6.1 Geology 16
  6.2 Foundations 17
  6.3 Earthwork 18
  6.4 Field Explorations 19
7.0 Basis for Recommendation........ 19
8.0 References........ 20

List of Figures

Name **Figure**

Vicinity Map 1
Site Plan and Geologic Map 2
Stabilization Fill 3

Appendix A

Prior Field Explorations

Geocon
Leighton and Associates
Krooskos, Williams and Associates
San Diego Geotechnical Consultants

1.0 SUMMARY

This report presents the results of our desktop investigation performed to provide geotechnical information for the proposed Beyer Community Park. The site is located on the southwest of the intersection of Beyer Boulevard and Enright Drive in San Diego, California. The approximate location of the proposed park is presented in Plate 1, Vicinity Map.

The investigation consisted of a site reconnaissance, the review of published and unpublished reports and the examination of aerial photographs. The approximate location of the field explorations previously completed by others are presented in Plate 2, Site Plan and Geologic Map. A summary of our findings and recommendations is presented below.

- The site is underlain by river terrace deposits and the San Diego Formation on the west side and the Otay Formation is present on the east side. In general, the formational materials consist of dense to very dense sandstone and conglomerate and hard siltstone and claystone. Zones of highly fractured materials were noted in various borings. Layers of highly plastic bentonitic clay were encountered within the Otay Formation. Landslide deposits were reported beneath the southern section of the parcel. Fill soils consisting of dense silty sand were encountered in two of the borings.

- Based on the reports reviewed, the soils within the site may be classified as having a low to very high expansion potential.

- Groundwater was not reported in borings drilled at the site. Seepage between lithologic units may occur during periods of heavy rainfall or due to irrigation.

- Based on the review of available information, a strand of the potentially active La Nacion Fault is located within the site. Accordingly, there is some potential for surface rupture at the study area, structural set-backs from the fault trace will be required.

- Previously mapped landslides are located to the northeast (Moody Canyon Landslide) and to the east and south (San Ysidro Landslide). Furthermore, materials associated with the Otay Mesa

Lateral Spread (OMLS) have been identified in the upper (eastern) section of the site. The limits of the landslides are not well defined and conflicting information exists within the information reviewed. Based on our limited field reconnaissance, we were able to confirm the limits of the northern end of the San Ysidro Landslide but additional field explorations and field mapping will be required to determine its boundary and set back.

- No evidence of landsliding within the northwest portion of the parcel was noted in the pre-earthwork aerial photographs reviewed (1928 and 1953). Previous investigations, and observations at the site, indicated that this portion of the site is underlain by nearly horizontally bedded materials of the San Diego formation. The southern border of the site, however, approximately parallels the northern boundary of the San Ysidro Landslide as mapped by previous investigations.

- The proposed facilities may be supported on undisturbed formational materials or compacted fill. Foundations for the proposed facilities may consist of shallow spread footings.

- Buttress and/or stabilization fills may be required for cut slopes. Remedial grading, including but not limited to overexcavation and recompaction of unsuitable materials or alternative foundations may be required if zones of weakness are encountered.

- The on-site soils may be used as compacted fill providing oversize material, expansive clays, debris or organic matter are removed. Selective grading may be required.

- Based on the information gathered during our desk top investigation, the site is suitable for construction of the proposed park, provided the design and construction incorporate means to mitigate the potential geologic hazards encountered. Means to minimize water infiltration as well as setbacks from known landslides and faults will be required.

- Future investigations at the site should include test pits to delineate the boundaries of the existing landslides and to evaluate the stability of the proposed slopes. Test pits should extend to depths of 10 to 15 feet. The approximate location of the proposed exploratory excavations is presented in Plate 2, Site Plan and Geologic Map.

2.0 SCOPE

Our scope of work consisted of the review published and unpublished information regarding the soils and the geologic conditions at the Beyer Community Park site. The purpose of this study was to evaluate the potential geologic hazards and the reported subsurface conditions in order to provide an opinion regarding the limits of the mapped landslides and to develop preliminary foundation design recommendations. More specifically, the scope of the investigation included the following:

- Perform a visual site reconnaissance.
- Review of published and unpublished geologic studies.
- Review of previous geotechnical investigations in the vicinity of the site. Previous boring and trench logs are included in Appendix A.
- Stereoscopic analysis of available aerial photography (summarized in the report text).
- Provide a preliminary opinion of the location of the existing landslide(s).
- Develop pre-design foundation and earthwork recommendations based on the information reviewed.
- Provide recommendations for future field explorations to be completed prior to final design.
- Preparation of this comprehensive report containing the results of the field reconnaissance and document review.

Our professional services have been performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice included in this report. This report has been prepared for Schmidt Design Group and their design consultants to be used solely in the evaluation and preliminary design of the subject project. This report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties or other uses

3.0 PROJECT DESCRIPTION

The proposed Beyer Community Park site is an L-shaped parcel located east of East Beyer Boulevard, south of the cul-de-sacs of Fantasy Lane and Delany Drive. The parcel and extends east of the intersection of Beyer Boulevard and Enright Drive into Moody Canyon. Single family residences are located to the north and west along Beyer Boulevard. The approximate location of the site is presented in Plate 1, Vicinity Map.

According to the information provided, we understand that the proposed park will include athletic fields, a storage/restroom building, parking and picnic areas.

4.0 INFORMATION REVIEW

Our study included the review of readily available published and unpublished documents. The documents included geotechnical reports completed for projects in the vicinity of the site; geologic and seismic publications, articles, and maps relative to the site and general vicinity; and aerial photographs taken from 1928 to 1983 and Google Imagery from 1994 through 2015. A list of the documents reviewed is presented in the reference section of this report.

4.1 REPORTS BY OTHERS

The reports reviewed included geotechnical investigations completed for the residential developments in the vicinity of the proposed park. The projects were designated as the Beyer Hills Estates, Units 1 and 2 and the Beyer Hill Park Apartments. A geotechnical report prepared for the proposed extension of Beyer Boulevard was also reviewed. These reports included exploratory borings and trenching and were performed from 1973 through 2005. The documents reviewed are listed in Section 8.0, References. The approximate location of the exploratory excavations is presented in Plate 2, Site Plan and Geologic Map.

The field explorations included 30-inch-diameter borings extending to depths of up to 90 feet and exploratory trenches extending to depths of up to 13 feet. The relevant test pits and/or borings to the current project are included in Appendix A.

According to the information contained in the boring logs, the materials beneath the proposed park include terrace deposits and dense to very dense sandstone and conglomerate associated with the San Diego Formation on the western portion of the site. The eastern portion of the site is reportedly underlain by dense to very dense, massive sandstone and hard siltstone and claystone of the Otay Formation. Landslide deposits associated with the San Ysidro Landslide were reported along the southern boundary. Highly plastic bentonitic claystone beds were noted in several of the borings. These materials have very high expansion potential, laboratory tests indicated expansion indexes of up to 468.

Groundwater and/or seepage was not encountered in the exploratory excavations within the site.

The La Nacion Fault zone was mapped as crossing the site in a northwest to southeast direction, east of the terminus of Beyer Boulevard. It was described as trending “through the center of the site in a northwest direction (N20W to N40W).” (SDGC, 1988). Vertical offsets, fractures, slicks and remolded zones associated with faulting were reported in the exploratory excavations.

Other structural features in the site vicinity include the Moody Canyon landslide to the northeast and the San Ysidro landslide to the east and south. The approximate location of the geologic features is presented in Plate 2, Site Plan and Geologic Map.

4.2 AERIAL PHOTOGRAPHIC REVIEW

A series of stereo-pairs of aerial photographs were obtained from the County of San Diego GIS Department. As listed in the reference section, aerial photographs were reviewed from 1928, 1953, 1966, 1973, 1976, 1978, and 1983 as well as Google Earth imagery from 1994 through 2015. A summary of our review is provided below.

1929 and 1953 Photograph

Beyer Boulevard and East Beyer Boulevard are visible west and northwest of the site, respectively. Moody Canyon extends west of the current alignment of East Beyer Boulevard. A hillside trending northwest to southeast is noted in the area currently occupied by single family residences. Evidence of the San Ysidro landslide (hummocky topography) is visible south and east of the site. Some dirt roads are visible but there is no evidence of grading at the site.

1966 Photograph

By 1966 the Beyer Elementary School are present. Dirt roads, one running north-south across Moody Canyon and one east-west along the southern canyon edge were noted. No visible evidence of grading was noted at the site. Site topography is as noted in the 1953 photograph.

1973 Photograph

East Beyer Boulevard has been completed and extends past Beyer Boulevard. The western end of Moody Canyon has been filled. Additional buildings for Beyer Elementary School are in place. The slope between the site and Beyer Elementary has been completed. Significant earthmoving has occurred at the site, the activity encompasses the area south of the site to the edge of the school and to the north to the current location of the San Ysidro Middle School. Temporary roads and borrow pit excavations can be seen. Available information indicates that the earthwork is related to the borrow activities undertaken as part of the I-805 Freeway, which can be seen under construction.

1976 and 1978 Photograph

The I-805 Freeway has been completed. Moody Canyon is at about its current configuration. What it appears to have been a borrow pit excavation can be seen at the location currently occupied single family residences. Improvements to Beyer Elementary School are visible.

1983 Photograph

The residences of the Beyer Hills Estates have been constructed. Beyer Boulevard is in its current configuration. No additional evidence of earthwork is evident in the photograph.

5.0 SITE CONDITONS

5.1 SITE RECONNAISSANCE

A preliminary site reconnaissance was performed January 27, 2017. The purpose of the site visit was to observe the existing site conditions including visible evidence of potential geologic hazards that may adversely impact the project. To more accurately locate and describe the previously identified features, as well as those noted during our research, we completed a subsequent site reconnaissance on March 3rd, 2017.

The reconnaissance(s) included observation of the exposed outcrops on the slopes surrounding the site, more specifically the cut slope along the western site boundary descending into the Beyer School site, the visible materials exposed on the slopes and borrow pits at the site. In general, the materials exposed included sandstone, siltstone and cobble conglomerate. The materials exposed on the slope were generally massively bedded and dipping gently to the north and northwest. Materials with significant variations in strike and dip were observed in some of the exploratory excavations. Evidence of slope failure associated with the Moody Canyon and the San Ysidro landslides was observed. An area of significant erosion which includes rills and gullies, slumping and shallow surficial slope failure were observed in the slopes southeast of the site. The approximate location of these features is presented in Plate 2, Site Plan and Geologic Map.

Looking Southwest at Beyer Park Site

5.2 EXISTING CONDITIONS

The area is currently undeveloped with numerous dirt roads crossing the site. Site topography varies from gently sloping and undulating to steep walls in the Moody Canyon area. The site is bound to the west by a 35- to 80-foot slope which descends into a parcel previously occupied by the Beyer Elementary School, to the north by the Beyer Hills Estates and to the east and south by undeveloped land.

In general, the site is composed of an upper and lower pads separated by a generally north-south trending ridge about 8 to 15 feet in height, where the La Nacion Fault has been mapped. Site topography on the western (lower) section is gently sloping and undulating, with elevations ranging from about 233 feet above mean sea level (m.s.l.) at the base of the ridge to elevations 181 to 200 feet m.s.l. along the western slope. Steeply graded and heavily eroded slopes characterize the eastern (upper) portion of the site, with elevations ranging from about 245 feet m.s.l. east of the La Nacion Fault Zone to about 285 feet m.s.l. on the eastern site boundary. Areas of significant erosion and/or slope failure were observed in the Moody Canyon and the slopes south and southeast of the site.

5.3 GEOLOGIC SETTING

The proposed Beyer Park site is located within the coastal plain portion of the Peninsular Ranges geomorphic province near the southern California batholith. The general structural trend of the province is northerly to northwesterly. The coastal plain is approximately 5 to 10 miles wide, consisting of sedimentary units which are part of the San Diego Embayment (Kennedy, 1975).

5.4 SUBSURFACE CONDITIONS

5.4.1 Geologic Materials

The site is underlain by three geologic formations and several types of surficial deposits including recent fill, alluvium, and landslide debris. The southern limits of the Otay Lateral Spread, an ancient region-wide mega-landslide, has been mapped east of the La Nacion Fault on site, however, we observed no evidence of its presence in the borings or cut slopes on the property. The geologic formations exposed on the site are the Otay Formation, an Oligocene aged sedimentary deposit, the Pliocene San Diego Formation, and an unnamed Late Pleistocene aged river terrace deposit. The surficial deposits consist of recent fill placed during past grading operations, stream deposited alluvium, and ancient landslides. Each are discussed in more detail below. The local site geology is presented on Plate 2, Site Plan and Geologic Map.

Otay Formation: The Otay Formation is well exposed east of the La Nacion fault on the surface of the graded area and low cut slope east of the La Nacion fault. In the eastern portion of the property this unit consists of interbedded, lightly cemented, fine gray sand and gray clayey siltstone. Although not exposed on site, this unit also contains waxy bentonite beds that vary in thickness from a few inches to several feet. Bentonite is a unique type of clay best known for its pink to light gray color, critically high expansive properties, and low shear strength. Its low shear strength and the fact that the clays have often been further weakened by lateral stress relief on the deeply incised canyons in the San Ysidro/Otay area has led to the formation of the massive landslides that occur wherever there are extensive outcrops of this unit. The San Ysidro Landslide, the northern limb of which underlies (and approximately parallels the southern portion (boundary) of the property, and the large landslides in Moody Canyon along the northern boundary of the site are typical of the types of landslides that occur within the Otay Formation. The Otay Formation is overlain by Late Pleistocene River Terrace Deposits and the San Diego Formation discussed below.

San Diego Formation: The San Diego Formation as mapped by previous geotechnical firms is exposed west of the La Nacion fault and south of the cul-de-sac at the south end of Enright Drive, and in the high cut slope along the western property line. This unit consists in part of very fine light gray sandstone and minor cobble conglomerate. Interbeds of siltstone and highly cemented calcareous cemented sands were also observed. The San Diego Formation as identified by previous studies is significantly thicker on the west side of the La Nacion fault probably as a result of down-to-the-west fault movement and basin deepening during the Pliocene.

River Terrace Deposits: Late Pleistocene age river terrace deposits occur in the central portion of the property as shown on the Geologic Map, Plate 2. This unit consists of massively bedded, light reddish- brown to light orange-brown, medium to fine grained sandstone and cobble to boulder conglomerate. This unit likely originated in an ancient floodplain of the ancestral Tijuana River. The eastern limit of this unit is formed by the La Nacion Fault where the fault has juxtaposed orange brown river terrace beds and light grey sandstone of the Otay Formation. To the west, this unit is well exposed at the top of the cut slope that forms the western boundary of the proposed park property.

Looking east at Beyer School slope

5.4.2 Groundwater

Groundwater was not reported within any of the borings or test pits excavated by others at the site. However, groundwater conditions could develop and/or seepage may occur depending on annual precipitation and irrigation. Seepage may occur along lithologic changes within the on-site soils and at the interface between the fill and the less permeable formational materials.

5.5 GEOLOGIC HAZARDS

5.5.1 General

Geologic hazards that could impact the subject site include landslides and those derived from earthquakes. A strand of the La Nacion fault crosses the site, there is a low potential for fault rupture and/or displacement due to an earthquake in this fault. In addition, damage due violent shaking from earthquake waves on nearby faults may also occur. Significant landslides have been mapped in the vicinity of the site. To the northeast, the Moody Canyon landslide and to the east and south the San Ysidro landslide.

5.5.2 Faults

The numerous faults in Southern California include active, potentially active, and inactive faults. The definitions of fault activity terms used here are based on those developed for the Alquist-Priolo Special Studies Zone Act of 1972.

Active faults are those faults that have had surface displacement within Holocene time (approximately the last 11,000 years) and/or have been included within an Alquist-Priolo Special Studies Zone. Faults are considered potentially active if they show evidence of surface displacement since the beginning of Quaternary time (about two million years ago), but not since Holocene time. Inactive faults are those which have not had surface movement since the beginning of Quaternary time.

The site is not within a currently established Alquist-Priolo Earthquake Fault Zone for fault rupture hazard (formerly Special Studies Zones for fault rupture hazard).

La Nacion Fault/Sweetwater Fault Zone: The La Nacion/Sweetwater Fault Zone, is a major down-to-the-west normal fault zone present in the south bay area of San Diego. The faults in the eastern portion of the zone are referred to as the La Nacion Fault Zone and the faults in the western part of the zone are part of the Sweetwater Fault Zone. The La Nacion fault is exposed in an approximately 10 feet high cut slope in the eastern portion of the site just south of the cul-de-sac on Enright Drive. Furthermore, evidence of faulting including displacements, slicks, and materials with significant variations of strike and dip, which resemble those of the anticipated fault were reported in the boring logs completed by others (SDGC, Geocon, Krooskos). Similar bedding was observed during our site reconnaissance. Kennedy (1977) indicates that faults of the Sweetwater Fault Zone displace Quaternary stream terrace materials younger than 125,000 years and an unnamed nearshore marine sandstone that may be correlative with the Bay Point Formation that is approximately 125 thousand years old. The Lindavista Formation of earliest Pleistocene age is the youngest formation depicted on Kennedy's published geologic map as being displaced by activity on faults within the La Nacion Fault Zone. There are, however, many strands making up the La Nacion Fault Zone and the lack of geomorphic expression of the fault throughout most of its length from near the Mexican Border to the San Diego State University area, suggests that the faults making up this wide fault zone have not been active during the Holocene.

Numerous exploratory trenches have been excavated across the main trace of the La Nacion Fault since its discovery in the early 1970's to assess its degree of activity resulting sometimes in conflicting fault activity data. The conflicts regarding the recency of fault activity are likely the result of the studies being performed on different strands of the fault. For example a study by Hart (1974) on the main trace of the fault in Poggi Canyon near Lilac Avenue in Chula Vista indicated that sediments carbon dated at 13,375 years Before Present (B.P.) were not displaced by faulting. Another more recent study by Leighton and Associates (personal communication, circa 2005) also performed in the Chula Vista area on possibly a different fault strand indicated the possibility that the fault may be active; that is it may have had displacement in the last 11,000 years. Because of the uncertainty of the age of last fault activity, current geotechnical practice calls for having structural setbacks from the fault of at least 25 feet for habitable structures (structures that will be occupied by persons for 2,000 hours per year or more).

5.5.3 Landslides and Slope Stability

According to the City of San Diego Seismic Safety Study, the site encompasses areas designated as zones of low to moderate risk for landslides (zone 53), possible landslides (zone 22) and, confirmed or highly suspected (zone 21). Evidence of San Ysidro and Moody Canyon landslides including slumping and hummocky topography can be observed to the southeast and northeast of the site, respectively.

Review of previous reports for various on-site projects and our independent analysis indicates that the extreme southern portion of the property is underlain by the San Ysidro Landslide. This approximately ¾ mile wide landslide extends from the surface of the mesa east of the site to the vicinity of the railroad tracks west of the property. The results of exploratory drilling by Accutech

Engineering in 1995 just west of Beyer Boulevard a few hundred feet north of the U.S./Mexico border suggests that the bottom of the landslide may lie below sea-level in that area.

We have reviewed borings and geotechnical data presented by several geotechnical firms including Geocon, Leighton and Associates, San Diego Geotechnical Consultants, and Southland Geotechnical. All the previous studies are in general agreement as to the location of the northern limits of the landslide as shown on Plate 2 of this report. As part of this review, we made a reconnaissance of the property and were able to confirm the location of the northern edge of the slide at least in the area east of the La Nacion Fault. The exact limits of the landslide directly south of the area proposed for the park are not known with certainty and accordingly the limits of the landslide in that area depicted on the geologic map are approximate. Additional large landslides are located on the north and south slopes of Moody Canyon directly east of the terminus of Beyer Boulevard. These landslides were investigated in detail by Geocon Inc. in 2005. San Diego Geotechnical Consultants investigated the approximately 80 feet high slope along the western boundary of the site with several borings. The results of their investigation indicated that the majority of the slope is underlain by essentially horizontally bedded sandstone, siltstone and claystone of the San Diego Formation. The southern 200 (+/-) feet of the slope is mapped as landslide debris however there is little geotechnical information to confirm that conclusion.

San Ysidro Landslide – Looking South

Moody Canyon Landslide – Looking North

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 GEOLOGY

Based on the review of available information, the potentially active La Nacion Fault crosses the site in a north-south direction, and as such, there is a possibility of surface rupture. Accordingly, structural setbacks from the mapped fault trace are recommended. The site would be subject to strong ground shaking in the event of an earthquake; however this hazard is common to Southern California, and the effects on the proposed project can be mitigated if the structures are designed and constructed in accordance with current engineering practice and building codes.

Two major landslides have been documented in the vicinity of the site, the Moody Canyon landslide to the north (off-site) and the San Ysidro landslide to the south and east. Based on available information, the limits of the San Ysidro landslide east of the La Nacion fault the northeast site boundary could be confirmed but not the southern boundary. Furthermore, the area east of the La Nacion Fault has been described as being part of the OMLS, however, we observed no evidence of this in the reviewed geotechnical reports.

Based on the information gathered during our desk top investigation, the site is suitable for construction of the proposed facilities, provided the design and construction incorporate means to mitigate the potential geologic hazards. Remedial grading, including overexcavation and recompaction, buttressing of slopes with adverse bedding and/or fractures as well as setbacks from known landslide masses will be required. Structural setbacks will be required from the mapped trace of the La Nacion fault.

Additional field explorations are recommended to confirm the landslide boundaries and to evaluate the stability of proposed. The approximate location of the landslides and of the proposed field explorations is presented in Plate 2, Site Plan and Geologic Map.

6.2 FOUNDATIONS

According to the documents reviewed, the lower portion of the site is underlain by dense to very dense river terrace deposits and the San Diego formation (sandstone, siltstone, claystone and cobble to boulder conglomerate). Materials associated with the Otay Formation and the OMLS are reportedly present beneath the upper portion east of the La Nacion Fault Zone.

Review of aerial photographs from 1928 to present, indicated that the site was significantly altered by cutting and filling into the original topography. Grading operations were completed as part of the materials mining operation undertaken during construction of I-805 in 1972 and 1973. Areas of fill were reported on the southwest corner of the site adjacent to the slope and on the upper section. These fill soils were placed in the excavated borrow pits after completion of the mining operations at the site (Krooskos, 1975).

The materials encountered at the site include silts and clays of high plasticity. Expansion indexes of 75 to 468 (SDGC, 1988) and of 0 to 63 (Geocon, 2005) were reported for materials encountered at the site. The clayey materials are classified as having a very high expansion potential.

The on-site materials minus highly expansive clays, debris or oversize materials may be used as compacted fills. Selective grading will be required.

The proposed facilities may be supported on undisturbed formational materials or compacted fill. Foundations for the proposed facilities may consist of shallow spread footings. Based on the laboratory testing performed by others the parameters noted in the table below, Preliminary Design Parameters may be used for planning purposes.

A bearing capacity of 2,000 pounds per square foot may be considered for on-site compacted fill soils. Additional testing will be required for final design.

Preliminary Foundation Design Parameters

	Compacted Fill Materials
Bearing Capacity	2,000 psf
Passive Pressure	300 psf
Frictional Capacity	0.3
Subgrade Modulus	100 pci

Remedial grading or alternative foundations may be required if zones of weakness are encountered. Field explorations including test pits to determine the fault location and subsurface conditions are recommended.

6.3 EARTHWORK

The formational materials are dense to very dense and stiff to hard. Zones of highly fractured materials were reported at several exploratory excavations and boulders were encountered in the River Terrace Deposits. The borings drilled at the site were advanced using large diameter bucket auger drilling equipment. Trench excavations were completed using a 24-inch backhoe. Refusal was not reported, but hard excavation may occur in the highly cemented zones. It is anticipated that conventional heavy duty excavation equipment could be used for the proposed excavations.

The on-site soils may be used as compacted fill providing oversize material, expansive clays, debris or organic matter are removed. Selective grading may be required.

Temporary excavations within the formational materials may be sloped back at 1 to 1. These materials are susceptible to erosion and surficial slumping when exposed. Erosion control measures will be required.

Introduction/infiltration of water into the ground is not recommended especially upslope or above existing landslides. Means to control and minimize irrigation and water infiltration into the subgrade is recommended. Overexcavation and recompaction of unsuitable materials, will be required. Adverse bedding and/or significant fractures may result in slope instability. Stabilization fills and/or buttresses may be required to stabilize slopes with adverse bedding. A typical buttress fill is presented in Plate 3, Stabilization Fill.

6.4 FIELD EXPLORATIONS

We recommend that future field investigations include geologic mapping of the exposed slopes and test pits to confirm the landslide boundaries. The test pits should extend to depths of 10 to 15 feet. Their final dimensions would be determined in the field as the investigation progresses. The locations of the proposed exploratory excavations are presented in Plate 2, Site Plan and Geologic Map.

7.0 BASIS FOR RECOMMENDATIONS

The conclusions and recommendations provided in this report are based on our understanding of the described project information and on our interpretation of the data collected during the desk top review of investigations performed by others and published geological information. No independent subsurface explorations or laboratory testing were conducted for this investigation. We have made our recommendations based on experience with similar subsurface conditions under similar loading conditions. The recommendations apply to the specific project discussed in this report; therefore, any change in the facility loads, expected traffic conditions, facility location, or site grades shall be provided to us so we may review our conclusions and recommendations and make any necessary modifications.

8.0 REFERENCES

Artim, E.R., and Pickney, C. J., 1973, *La Nacion Fault System, San Diego, California*, in Studies on the Geology and Geologic Hazards of the Greater San Diego, California: San Diego Association of Geologists.

City of San Diego, *Seismic Safety Study, Geologic Hazards and Faults*, Grid Tile: 2, April 2008.

Elliot, W. J., 1989, "Age of Landsliding-Implications for Recency of Movement along the La Nacion Fault near Dusk Drive, San Diego, California": The Seismic Risk in the San Diego Region.

Foster, J.H., 1973, *Faulting Near San Ysidro, Southern San Diego County, California*: in Ross, A. and Dowlen, D.J., editors, *Studies on the Geology of the Greater San Diego Area, California,* S.D.A.G. and A.E.G. Field Trip Guidebook.

Geocon, Inc., *Geotechnical Investigation, Beyer Boulevard Extension, Otay Mesa Community Plan Amendment, San Diego, California*, January 4, 2005.

Geotechnics, Inc., *Geotechnical Update and Grading Plan Review, Beyer Hill Estates II, San Diego, California,* September 28, 2001.

Google Earth at http://www.google.earth.com, accessed January through March, 2017.

Google Maps at http://www.googlemaps.com , accessed January through March, 2017.

Hart, Michael W., 1974, Radiocarbon ages of alluvium overlying La Nacion fault, San Diego, California, Geological Society of America Bulletin , v.85, p. 1329-1332.

Hart, Michael W., Shaller, Phillip J., Farrand, Gregory T., *When Landslides are Misintrepreted as Faults: Case Studies form the Western United States*, AEG Environmental and Engineering Geoscience, Vol. XVIII, No. 4, November 2012, pp. 313-325.

Jennings, C.W., 1994, *Fault activity map of California and adjacent areas:* California Division of Mines and Geology: California Geologic Map Series, Map No. 6.

Kennedy, M.P., and Moore, G.W., 1971, *Stratigraphic Relations of Upper Cretaceous and Eocene Formations, San Diego Coastal Area, California*, American Association of Petroleum Geologists Bulletin, v. 55, p. 709-722

Kennedy, M.P., 1975, *Geology of the San Diego Metropolitan Area, California*, California Division of Mines and Geology, Bulletin 200, Section A.

Kennedy, M.P. Tan, S.S., Chapman, R.H., and Chase, G.W., 1975, *Character and Recency of Faulting, San Diego Metropolitan Area, California*, California Division Mines and Geology, Special Report 123.

Kennedy, M.P. and Tan, S.S., 2008, *Geologic Map of the San Diego 30' by 60' Quadrangle, California*, California Geological Survey.

Kennedy, M.P., and Welday, E.E., 1980, *Recency and Character of Faulting Offshore Metropolitan San Diego*, California Division Mines and Geology, Map Sheet 40.

Krooskos, William and Associates, *Engineering Geology Study, San Ysidro Project, North Vista Avenue, San Diego, California,* 1973.

Kuper, H. T., 1989, *La Nacion Fault System: Interpretation from Stratigraphic and Depositional Evidence.* Seismic Risk in the San Diego Region: Special Focus on the Rose Canyon Fault System.

Leighton and Associates, *Engineering Geologic Investigation, Northwestern Flank of San Ysidro Landslide, Beyer Hills Estates, Unit 2, San Ysidro, California,* June 11, 1980.

Medall, Worswick and Associates, *Geotechnical Review of Report "Geotechnical Review and Reconnaissance, Proposed Tentative and PRD Map, Beyer Hill Park Apartments, San Diego, California", Prepared by San Diego Soils Engineering, Inc., Dated July 15, 1986"*, prepared for the City of San Diego, September 29, 1986.

San Diego County Information Services, *Aerial Photographs:* San Diego, Photo 142-1755, November 1928 to March 1929.

San Diego County Information Services, *Aerial Photographs*: Flight AXN, Photo 3M-30, March 31, 1953.

San Diego County Information Services, *Aerial Photographs*: Flight VBO-1, Photos 25-26, Scale 1":125,000', November 1966.

San Diego County Information Services, *Aerial Photographs*: SDPD, Photos 20-3, Scale 1":1,000', December 10, 1973.

San Diego County Information Services, *Aerial Photographs*: San Diego, Mosaic, SPC 64-76, Photo 323, Scale 1":2,000', October 5, 1976.

San Diego County Information Services, *Aerial Photographs*: SDCO, Photos 28-D25, October 23, 1978.

San Diego County Information Services, *Aerial Photographs*: Flight CAS, Photo 65, Scale 1”:2,000’, November 19, 1983

San Diego Geotechnical Consultants, Inc., *Geotechnical Investigation, Beyer Hill Park Apartments, San Ysidro, California,* June 18, 1988.

Southland Geotechnical Consultants, *Geotechnical Review of Existing Geotechnical Information for the City of San Diego’s Proposed Beyer Athletic Fields, East End of Beyer Boulevard, San Ysidro Area of the City of San Diego, California,* April 4, 2007.

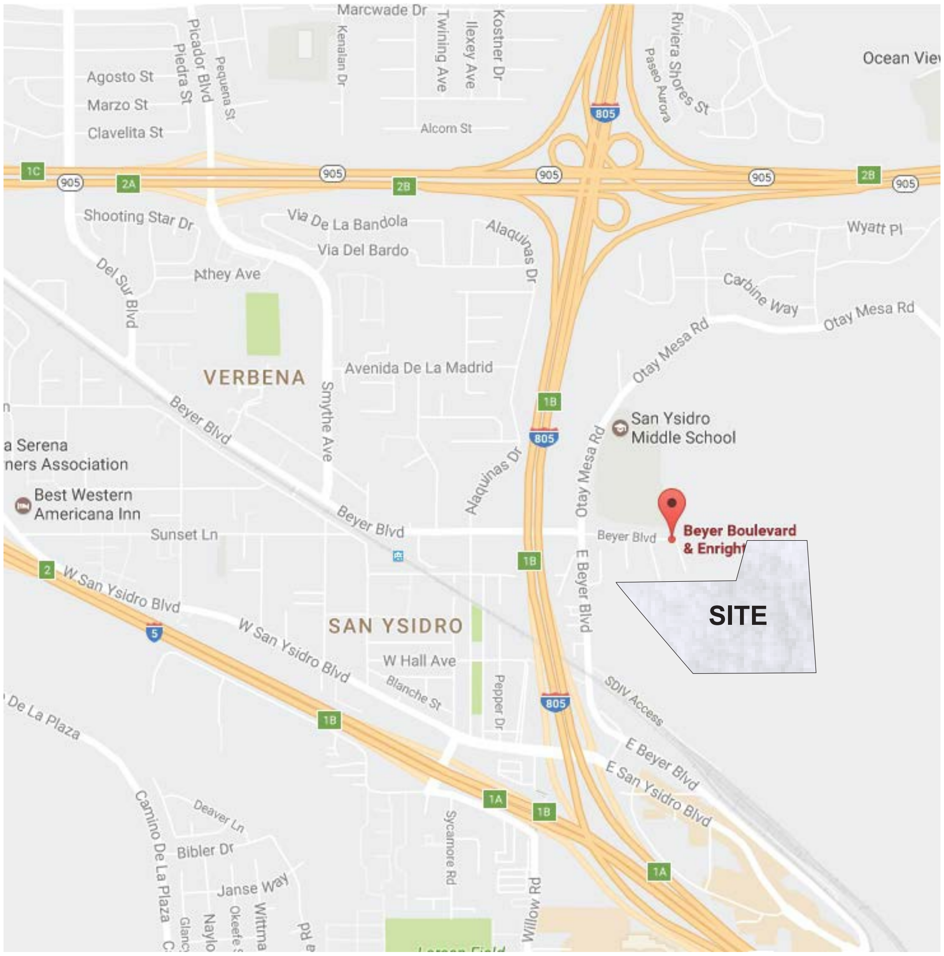
Vanderhurst, W. Lee, Hart, Michael W., Warren, Chad, *The Otay Mesa Lateral Spread, a Late Tertiary Mega-Landslide in Metropolitan San Diego County, California,* AEG Environmental and Engineering Geoscience, Bol. XVII, No. 3, August 20011, pp. 241-253.

William S. Krooskos and Associates, *Update Report, Beyer Hill Estates Unit I, San Diego, California*, July 11, 1982.

William S. Krooskos and Associates, *Report of Soil Investigationand Geologic Study, Beyer Hill Estates, Beyer Boulevard and East Beyer Boulevard, San Diego, California*, July 21, 1977.

Ziony, J.i., 1973, *Recency of Faulting in the Greater San Diego Area, California*: in Ross, A. and Dowlen, D.J., editors, *Studies on the Geology of the Greater San Diego Area, California,* S.D.A.G. and A.E.G. Field Trip Guidebook.

JOB G2017001-1 DATE 3/20/2017 BY SK ENGR SCK REV



VICINITY MAP

PROPOSED
BEYER COMMUNITY PARK
SAN DIEGO, CALIFORNIA

(NOT TO SCALE)

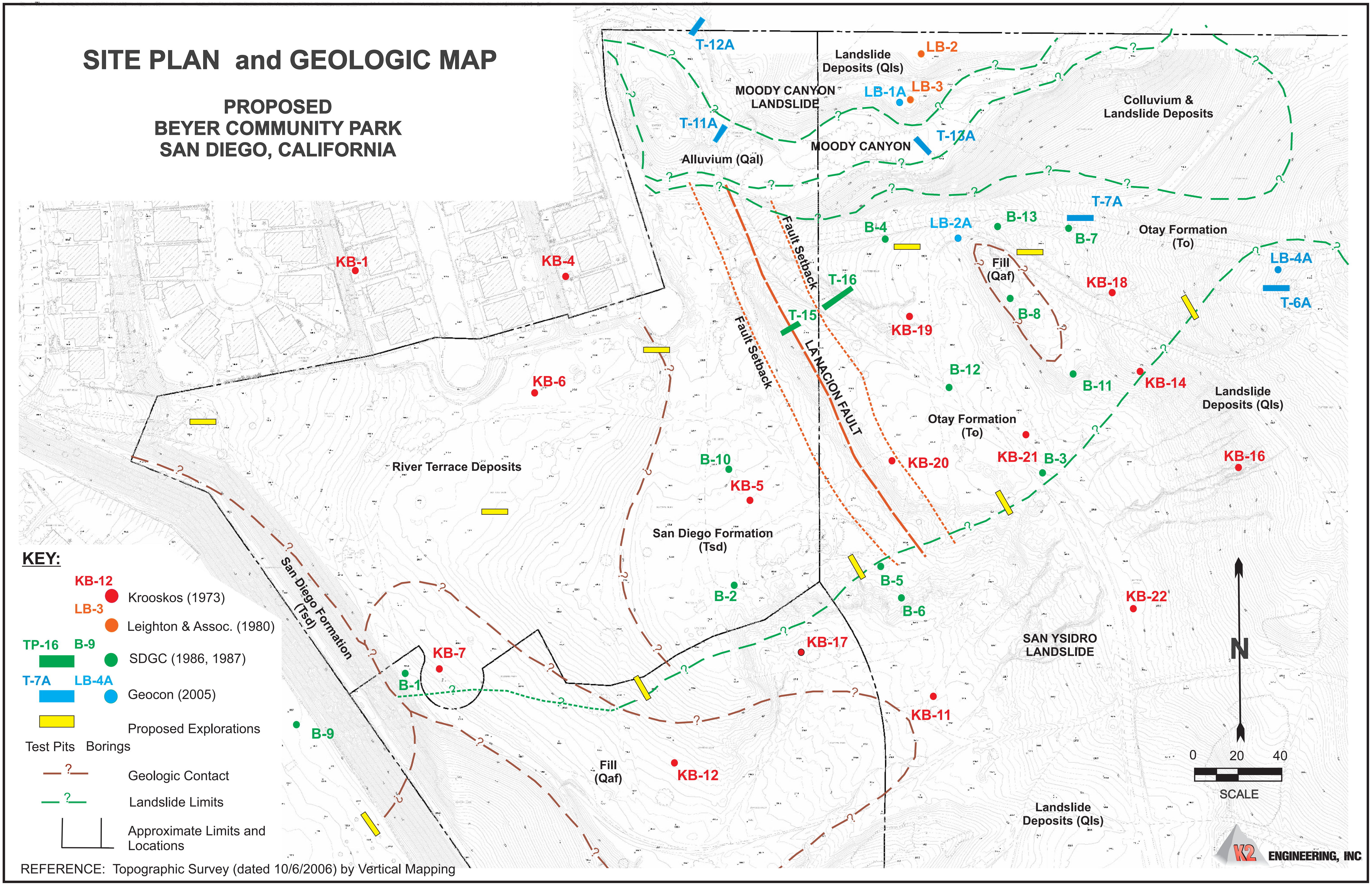
REFERENCE: Google Maps and Imagery (2017)

K2 ENGINEERING, INC.

JOB G2017001-1 DATE 3/20/2017 BY SCK/MH ENGR REV

SITE PLAN and GEOLOGIC MAP

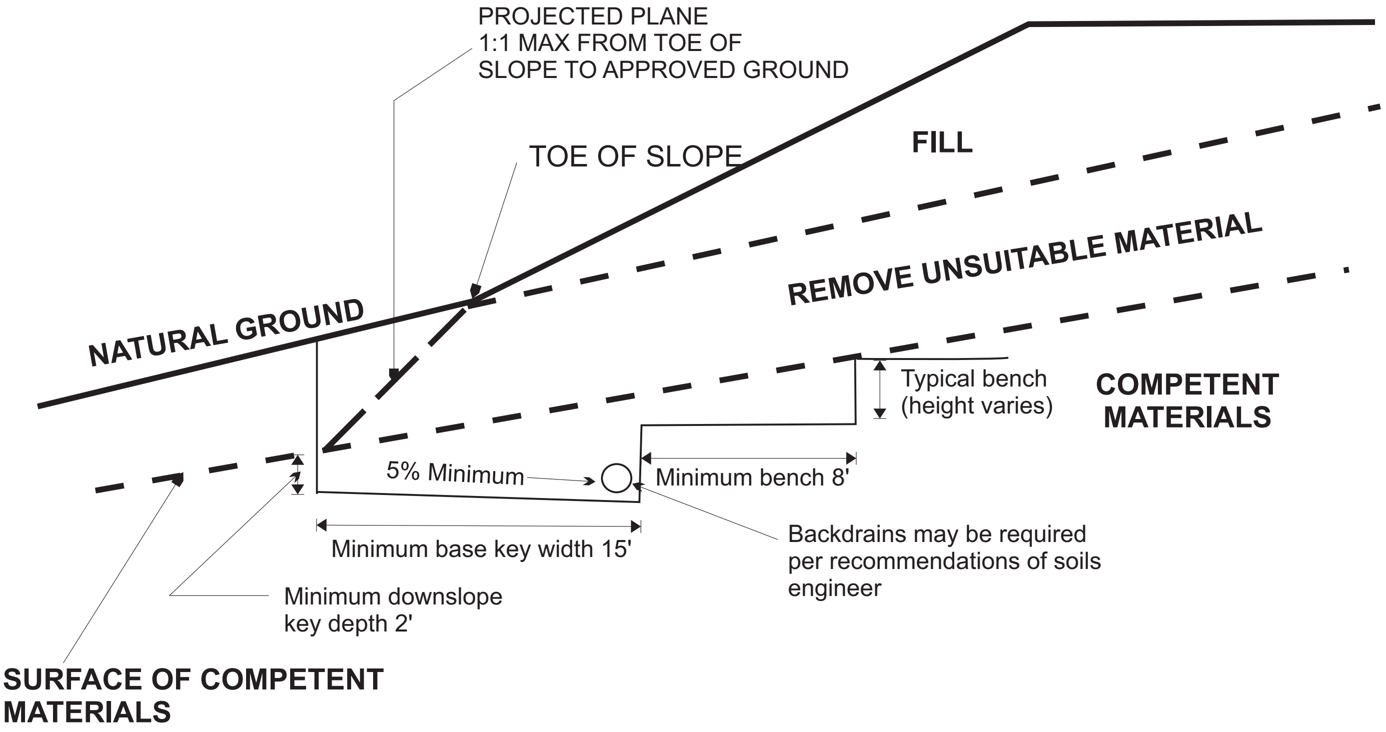
PROPOSED
BEYER COMMUNITY PARK
SAN DIEGO, CALIFORNIA



REFERENCE: Topographic Survey (dated 10/6/2006) by Vertical Mapping

K2 ENGINEERING, INC

JOB G2017001-1 DATE 03/20/2017 BY SCK ENGR SCK REV ____



FILL SLOPE KEY

K2 ENGINEERING, INC.

APPENDIX A

PRIOR

FIELD EXPLORATIONS

GEOTECHNICAL INVESTIGATION
BEYER BOULEVARD EXTENSION
OTAY MESA COMMUNITY PLAN AMENDMENT
SAN DIEGO, CALIFORNIA

By: Geocon, Inc.

January, 2005

PROJECT NO. 07254-42-01

BORING LB-1A

ELEV. (MSL.) 230' DATE COMPLETED 10-25-2004

EQUIPMENT EZ BORE 100 30" ROTARY BUCKET

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	LB1A-5				Dense to very dense, damp, light yellowish brown, Silty, fine to medium SANDSTONE	26	111.9	6.5
32	LB1A-6				-Bedding horizontal, becomes very dense			
34								
36					-2-inch thick cemented zone			
38								
40	LB1A-7			SM		30	124.1	10.6
42					-Transition to coarse grained, silty sand with subangular to subrounded fine gravel (grit), with thin cemented layers			
44								
46								
48								
50	LB1A-8					40/10"		

BORING TERMINATED AT 51 FEET
No groundwater encountered

Figure A-1,
Log of Boring LB-1A, Page 2 of 2

07254-42-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◧ ... STANDARD PENETRATION TEST
◣ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07254-42-01

BORING LB-2A

ELEV. (MSL.) 260' DATE COMPLETED 10-26-2004

EQUIPMENT EZ BORE 100 30" ROTARY BUCKET

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 2 4	LB2A-1			ML	**OTAY FORMATION SILTSTONE** Dense, damp, medium gray, fine, Sandy SILTSTONE; with thin interbedded silt, fine sandstone			
6	LB2A-2			ML-CL	Dense, damp, medium gray-brown, Clayey SILTSTONE	8	99.4	24.9
8 10 12	LB2A-3			SM	Very dense, damp, light gray, Silty, fine SANDSTONE; massive	18		
14					-Cemented layer 2-inches thick N65E, 11SE			
16 18 20	LB2A-4			CL-ML	Hard, damp, medium brown to gray, Sandy CLAYSTONE and Clayey SILTSTONE; approx. horizontal beds -Very dense, Silty, very fine SANDSTONE layer approx. 2 feet thick, grading to siltstone -Reddish brown coloration grading from siltstone to claystone	10	119.3	12.2
22 24 26 28				SM	Very dense, damp, very light gray, slightly Silty, fine SANDSTONE; becomes friable, less cemented -Cemented layer, N40E, 11SE 2 to 3-inches thick			

Figure A-2,
Log of Boring LB-2A, Page 1 of 2

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. 07254-42-01

BORING LB-2A

ELEV. (MSL.) 260' DATE COMPLETED 10-26-2004

EQUIPMENT EZ BORE 100 30" ROTARY BUCKET

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	LB2A-5					17		
32					Dense, damp, medium brown, Sandy SILTSTONE to Silty SANDSTONE			
34					-Very stiff, pinkish brown 4-inch thick bentonite layer; N20W, 8NE			
36				ML-SM	-Claystone bed 1-inch thick N40W, 6SW			
38								
40					Very hard, damp, medium brown-olive, very Clayey SILTSTONE to Silty CLAYSTONE			
42	LB2A-6			ML-CL				
44								
46					-Bentonite claystone bed approx. 8-inches thick, approx. horizontal at 46½ feet			
48					Very dense, damp, light brown, very Silty, fine SANDSTONE; bedding N20E, 5SE			
50				SM				
52					-Transition to bentonitic clayey sandstone at 52½ feet			
54								
					BORING TERMINATED AT 55 FEET No groundwater encountered			

Figure A-2,
Log of Boring LB-2A, Page 2 of 2

SAMPLE SYMBOLS
☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
▮ ... STANDARD PENETRATION TEST
◣ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07254-42-01

BORING LB-4A

ELEV. (MSL.) 350' DATE COMPLETED 11-02-2004

EQUIPMENT EZ BORE 100 30" ROTARY BUCKET

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**LANDSLIDE DEBRIS (Older)** Dense, dry to humid, dark brown, Silty, fine SAND; numerous white calcium carbonate (caliche) lined fractures			
2					Medium dense, damp, light gray, fine, Sandy SILT; (mottled with white caliche)			
4	LB4A-1							
6	LB4A-2			ML		3	96.5	13.8
8					-Becomes medium gray-brown			
10	LB4A-3				Dense, damp, reddish brown, Gravelly to Clayey SAND; sandy bedding parting surfaces at N25E, 10NW	10		
12	LB4A-4			SC				
14								
16	LB4A-5				Becomes Sandy, coarse GRAVEL with some Silt	10		
18								
20	LB4A-6					12		
22				GM				
24								
26					-Approx. imbrication layers of gravel at N-S, 30E, likely to be block slide-rotated bedding of the Terrace Deposit Gravel. This may represent a large landslide - block within the San Ysidro Landslide complex that is older than those in Moody Canyon			
28								

Figure A-4,
Log of Boring LB-4A, Page 1 of 3

07254-42-01.GPJ

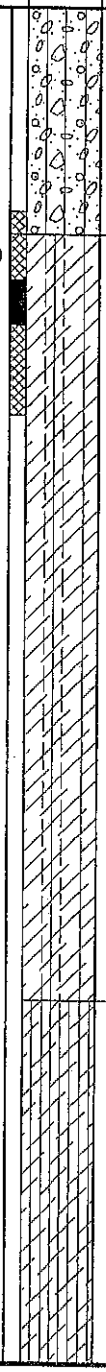
SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◧ ... STANDARD PENETRATION TEST
◩ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

BORING LB-4A

ELEV. (MSL.) 350' DATE COMPLETED 11-02-2004

EQUIPMENT EZ BORE 100 30" ROTARY BUCKET



DEPTH IN FEET	SAMPLE NO.	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30							
32			GM				
34							
	LB4A-9			-Remolded (shear) clayseam approx. 2-inches thick with pink bentonite N45W, 45SW at 35 feet (landslide failure surface)			
	LB4A-10			**OTAY FORMATION BENTONITIC MEMBER**			
36	LB4A-7			Hard, moist, light gray to pinkish brown, very Silty CLAYSTONE to dense, Clayey SILTSTONE (this unit exhibits features of "lateral spread" ancient submarine landslides and is considered inactive when undisturbed	15	109.7	17.5
	LB4A-8						
38							
40				Bedding with localized polished surfaces N85W, 26N shear on bentonitic clay layer N30E, 70SE. Bedding E-W, 25N along 4-6" cemented layer			
42			CL-ML	Open fractures 1/8-inch wide N70W, 67NE with striated surfaces (striations parallel to dip)			
44				Possible "flame" structures, with sharp variations in bedding. Bedding N70E, 20NW			
46				Discontinuous steep open fractures in various directions with voids, sheared laminated siltstone bedding N70E, 15NW is sheared at N40E, 57NW, transitioning to dense, massive siltstone			
48							
50				-Gradual transition into massive horizontal beds; bottom of "lateral spread" feature (?)			
52				**OTAY FORMATION SILTSTONE**			
54				Dense, damp, light gray-olive, Clayey SILTSTONE; massive to approx. horizontal bedding			
56			ML				
58							

Figure A-4,
Log of Boring LB-4A, Page 2 of 3

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◧ ... STANDARD PENETRATION TEST
◣ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▽ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07254-42-01

BORING LB-4A

ELEV. (MSL.) 350' DATE COMPLETED 11-02-2004

EQUIPMENT EZ BORE 100 30" ROTARY BUCKET

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	■ LB4A-11					35	106.9	17.9
	☒ LB4A-12							
62				ML				
64								
					BORING TERMINATED AT 65 FEET No groundwater encountered			

Figure A-4,
Log of Boring LB-4A, Page 3 of 3

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. 07254-42-01

TRENCH T- 6A

ELEV. (MSL.) 350' DATE COMPLETED 10-12-2004

EQUIPMENT JD 310 24"

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 2				CL	**LANDSLIDE DEBRIS (Older)** Soft, humid, dark gray-olive, Gravelly, Silty CLAY; porous, irregular transition			
4 6				GM	Medium dense, damp, medium reddish brown, Sandy, coarse GRAVEL; disturbed conglomerate of the pleistocene Lindavista Formation, with imbricated cobbles inclined (rotated) approx. 5° E			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-13,
Log of Trench T- 6A, Page 1 of 1

07254-42-01.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. 07254-42-01

TRENCH T- 7A

ELEV. (MSL.) 228' DATE COMPLETED 10-12-2004

EQUIPMENT JD 310 24"

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	**LANDSLIDE DEBRIS (Older)** Stiff, humid, dark olive-brown, Sandy CLAY; weathered soil mantle			
					Dense, damp, light gray-olive, Silty, fine SAND; fractured, rotated block of Otay Formation E to W, 40°N in Clayey SILTSTONE layer			
2								
4				SM				
6								
8					TRENCH TERMINATED AT 8 FEET			

Figure A-14,
Log of Trench T- 7A, Page 1 of 1

07254-42-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◧ ... STANDARD PENETRATION TEST
◪ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07254-42-01

TRENCH T-11A

ELEV. (MSL.) ____________ DATE COMPLETED 10-15-2004

EQUIPMENT JD 310 24"

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 8		SM	**UNDOCUMENTED FILL** Loose, damp, light tan to brown, Silty, fine SAND; little or no compaction, evident, porous			
8 – 14	T11-1	SM	**ALLUVIUM** Loose, moist, medium brown to reddish brown, Gravelly to Silty, fine SAND; porous			
14 – 18½		SM-GM	Loose, moist, medium brown, very Gravelly, Silty, fine to medium SAND; with lenses of silt -Becomes coarse, with 12 to 18-inch cobble-boulders			
			TRENCH TERMINATED AT 18½ FEET			

Figure A-18,
Log of Trench T-11A, Page 1 of 1

07254-42-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◨ ... STANDARD PENETRATION TEST
◪ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07254-42-01

TRENCH T-12A

ELEV. (MSL.) ____________ DATE COMPLETED 10-15-2004

EQUIPMENT JD 310 24"

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC	**UNDOCUMENTED FILL** Loose, damp, medium to light brown (mottled), very Gravelly, Clayey, fine SAND			
2								
4								
6								
8				SC-GC	**ALLUVIUM** Loose to stiff, moist, dark brown, very Gravelly, Clayey, fine to medium SAND; porous, with pinhole voids			
10								
12				GC	**BAY POINT FORMATION** Medium dense to dense, very moist, reddish brown, Clayey to Sandy, fine to coarse CONGLOMERATE; massive, little or no porosity, with horizontally imbricated rounded cobbles			
14	T12-1 T12-2							
16								
					TRENCH TERMINATED AT 17 FEET			

07254-42-01.GPJ

Figure A-19,
Log of Trench T-12A, Page 1 of 1

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. 07254-42-01

TRENCH T-13A

ELEV. (MSL.) 216' DATE COMPLETED 10-15-2004

EQUIPMENT JD 310 24"

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM** Loose, dry to humid, light brown to tan, very Sandy, coarse GRAVEL; friable, poorly graded, noncohesive sand matrix, with caving			
2								
4				SP-GP				
6								
8								
10				SM	**OTAY FORMATION SILTSTONE** Dense, damp, light gray to tan, very Silty, fine SANDSTONE; horizontally laminated			
					TRENCH TERMINATED AT 10½ FEET (Caving)			

Figure A-20,
Log of Trench T-13A, Page 1 of 1

SAMPLE SYMBOLS
☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
▮ ... STANDARD PENETRATION TEST
◣ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

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

ENGINEERING GEOLOGIC INVESTIGATION
NORTHWESTERN FLANK OF SAN YSIDRO LANDSLIDE
BEYER HILLS ESTATES – UNIT 2
SAN YSIDRO, CALIFORNIA

By: Leighton and Associates.

June, 1980

PROJECT NO. 06847-42-01

BORING LB 1

ELEV. (MSL.) 492 DATE COMPLETED 8/23/02

EQUIPMENT SOILMEC 108 TRUCK MT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**TERRACE DEPOSIT CLAY** Stiff, damp, dark brown, very Sandy CLAY			
2				CL				
4					**TERRACE DEPOSIT GRAVEL** Medium dense, humid to damp, light reddish brown, Gravelly, coarse SAND, trace clay, silt, slight caving			
6	LB1-1 ▨			SP				
8								
10	LB1-2 ▨				Medium dense, moist, reddish brown, very Gravelly, Silty SAND, with some clay, subrounded to rounded, fine to medium size (1" to 6" diameter)			
12								
14								
16				SM-GM				
18								
20								
22								
24								
26								
28								

Figure A-1, Log of Boring LB 1

SOM

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. 06847-42-01

BORING LB 1

ELEV. (MSL.) 492 DATE COMPLETED 8/23/02

EQUIPMENT SOILMEC 108 TRUCK MT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30 32 34				SM-GM				
36 38 40 42 44 46	LB1-3 ▨			GM	Very dense, moist, light to medium red brown, Silty, Sandy, very coarse GRAVEL, 8" to 24" diameter clasts, trace clay -12 inch clean sand layer; horizontal laminated bedding			
48 50 52 54 56 58	LB1-4 ▨			GM-SM	Dense, moist, medium reddish brown, very Silty, Sandy, medium to coarse GRAVEL			
				SM	-Sharp depositional contact at 58.5 feet N55E, 5NW with undulations dipping approximately 2 degrees to SW and NW			

Figure A-2, Log of Boring LB 1

SAMPLE SYMBOLS
☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◧ ... STANDARD PENETRATION TEST
◪ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 06847-42-01

BORING LB 1

ELEV. (MSL.) 492 DATE COMPLETED 8/23/02

EQUIPMENT SOILMEC 108 TRUCK MT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60					**SAN DIEGO FORMATION** Dense, damp, light gray to yellow-brown, Silty fine SANDSTONE with some friable (cohesionless when disturbed) sand layers -Horizontal to gently undulating laminated micaceous beds (interbedded sandy siltstone and sandstone with 1" to 3" thick alternating beds			
	LB1-5 ☒							
62								
64								
66					BORING TERMINATED AT 66 FEET			

Figure A-3, Log of Boring LB 1

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. 06847-42-01

BORING LB 6

ELEV. (MSL.) 496 DATE COMPLETED 8/30/02

EQUIPMENT SOILMEC 108 TRUCK MT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 2 4 6				CL	**TERRACE DEPOSIT CLAY** Stiff, moist, dark yellow brown, Sandy CLAY, with some fine gravel, massive			
8 10				SM	**TERRACE DEPOSIT GRAVEL** Medium dense to dense, damp, medium reddish brown, very Gravelly, Silty, medium to coarse SAND with trace clay			
12 14 16 18 20 22 24 26 28				GP-SP	Dense, damp, medium reddish brown, very Sandy coarse GRAVEL, with cobbles 6 to 8 inches, low cohesion, (when disturbed), with some sloughing			
				SP				

Figure A-14, Log of Boring LB 6

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. 06847-42-01

BORING LB 6

ELEV. (MSL.) 496 DATE COMPLETED 8/30/02

EQUIPMENT SOILMEC 108 TRUCK MT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30								
32				SP	Medium dense to dense, damp, light reddish brown, Gravelly coarse SAND -Sloughing and non cohesive (when disturbed), crossbedded			
	LB6-1 ⊠							
34								
36								
38					Very dense, damp to moist, medium brown to reddish brown, Sandy, very coarse GRAVEL -Oversize cobbles 8 to 20 inches diameter in slightly silty coarse sand matrix, with trace clay			
40								
42								
44				GM				
46								
48								
50								
52								
54								
56								
58								

Figure A-15, Log of Boring LB 6

SOM

SAMPLE SYMBOLS	☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
	⊠ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

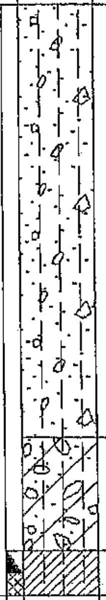
NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. 06847-42-01

BORING LB 6

ELEV. (MSL.) 496 DATE COMPLETED 8/30/02

EQUIPMENT SOILMEC 108 TRUCK MT



DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60								
62								
64				GM				
66								
68								
70					Becomes Clayey to Silty, with fine to medium rounded conglomerate layers, horizontally imbricated			
72	LB6-2 LB6-3			CL	-Approximately horizontal to undulating scour-deposition contact		72.8	40.5
					OTAY FORMATION Hard, moist, light olive-gray, Silty CLAYSTONE; massive, blocky			

BORING TERMINATED AT 73 FEET

Figure A-16, Log of Boring LB 6

SOM

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.

ENGINEERING GEOLOGY STUDY
SAN YSIDRO PROJECT
NORTH VISTA AVENUE
SAN DIEGO, CALIFORNIA

By: Krooskos, William and Associates

1973

BORING SUMMARY SHEET

Boring No 1,2 Elevation ___
(30" Dia. Bucket)

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (–) % swell (+)
	◎	Loose, moist, brown, slightly clayey, coarse sand, gravel & cobbles (GC) S=50% G to 6"=45% C to 8"=5%					
5	◎	Loose, moist, brown, coarse sand, gravel and cobble (GP) S=40% G to 6"=40% C.to 18"=20% Bottom of Hole					
		Boring No. 2 (30" Dia. Bucket)					
0		Firm, moist, red-brown, clay (CL)					
5	◎	Loose, damp, brown, clayey sand & cobbles to 18" (SC)					
		Stiff, moist, green, clay (CL) TOPSOIL----↓					
10		Dense, damp, light green-brown, fine sand (SW)					
15		Med. dense, damp, light green-brown, fine to med. sand & cobbles (SW) S=70% G=30% under 6"					
		Hard, damp, gray-green, fine sandy clay & clayey fine sand (CL-SC) Bottom of Hole					

LEGEND

①	Undisturbed Sample	≡	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 73-3706
Figure No. I

DEPTH IN FEET	SAMPLE NO.	BORING SUMMARY SHEET Boring No 3,4 Elevation ___	DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (–) % swell (+)
		Loose, moist, brown, coarse sand, gravel & cobbles (GP) S=65% G=30% C=5%					
5	◎						
	◎						
10		Dense, damp, green-brown, fine sandstone (SP) S=100%					
	◎						
15		Hard, damp, light green-brown, sandy claystone & caliche lenses (CL) S & Clay=100% Bottom of Hole					
		Boring No. 4					
0		Loose, damp, red-brown, clayey silty sand (SC)					
	◎	Med. dense, damp, gray-brown, silty fine to med. sand (SW)					
5							
		Med. dense, damp, green-brown, med. sand (SP)					
10							
	◎	Med. dense, damp, brown,-green, sandy silt & silty sand (ML-SM) S=95% G=5%					
15		Loose, slightly damp, light gray-brown, med. coarse sand (SW)					
		Loose, dry, light gray-brown, med.-coarse sand 30% gravel to 4"					
20	◎						
		Bottom of Hole					

LEGEND

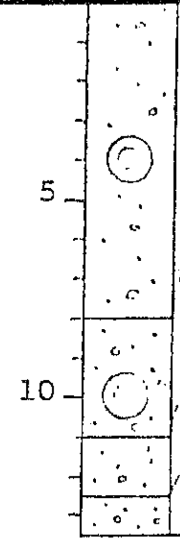
①	Undisturbed Sample	≟	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 73-3706
Figure No. II

BORING SUMMARY SHEET

Boring No 5, 6 Elevation ____

DEPTH IN FEET	SAMPLE NO.	DESCRIPTION	DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (-) % swell (+)



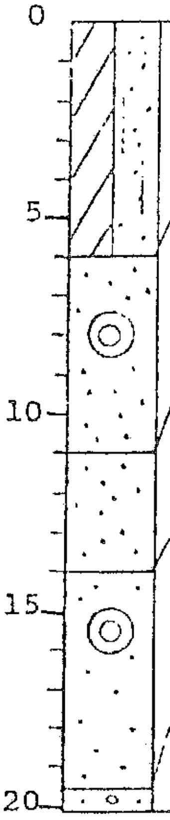
Med. dense, moist, brown, coarse sand gravel & cobble (GP)
S=75% G=20% C=5%

Loose, damp, brown, coarse sand gravel & cobble (GP)
S=60% G=35% C=5%

S=40% G=55% C=5%

Loose, damp, brown, large cobbles sand & gravel (GP) S=35% G=35% C=30%
Bottom Of Hole

Boring No. 6



Loose, damp, light brown, mixed clay, coarse sand, fine sand, silt, & cobble (CL-SW-ML) FILL--------

Loose, damp, brown, coarse sand (SW) S=95% G=5%

Loose, damp, light gray-brown, coarse sand (SW) S=95% G=5%

Loose, damp, brown, coarse sand (SW) S=95% G=5%

Loose, damp, brown, sand & cobble (SP) S-50% G=25% C=25%

Bottom of Hole

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

Water Table

(SM) Unified Soil Classification

Job No. 73-3706
Figure No. III

BORING SUMMARY SHEET

Boring No 7,8,9,10 Elevation ___

DEPTH IN FEET	SAMPLE NO.	DESCRIPTION	DRY DENSITY lbs/cu ft.	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement(-) % swell (+)
		Med. dense, damp, green-brown, fine to med. sand (SW)					
5	◎	Dense, damp, green-brown, sandy siltstone & fine sandstone (ML-SP) Bottom of Hole					
		Boring No. 8					
0		Loose, dry, brown, silty fine sand (SM) Becomes light gray-brown					
5	◎	ALLUVIUM					
10							
15		Large cobbles Bottom of Hole					
		Boring No. 9					
0		Med. dense, dry, brown, silty fine sand (SM) ALLUVIUM					
5		Loose, dry, brown, silty sand, gravel & cobbles (SM) S=40% G=50% C=10% BH					
		Boring No. 10					
0		Med. dense, dry, brown, silty fine sand & gravel (SM) S=75% G=25% ALLUVIUM					
5		Stiff, damp, dark brown, sandy clay, gravel & cobbles (CL) C=35% G=35% C=30% Bottom of Hole					

LEGEND

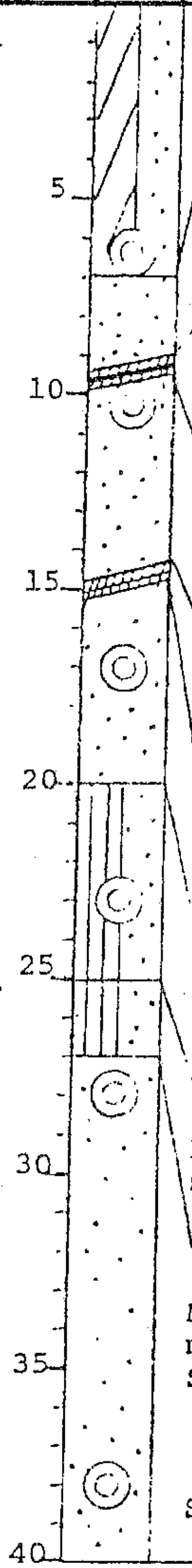
①	Undisturbed Sample	∇	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 73-3706
Figure IV

BORING SUMMARY SHEET

Boring No 11 Elevation ___

DEPTH IN FEET | SAMPLE NO | DRY DENSITY lbs/cu ft | IN PLACE MOISTURE, % of dry weight | SHEAR RESISTANCE kips/sq ft | DRIVE ENERGY ft kips/ft | % settlement (–) % swell (+)



Loose, damp, brown, coarse clayey sand gravel & cobble (SC) FILL ---
S=40% G=40% C=20%

Dense, damp, brown, poorly graded fine sand (SP)

Firm, damp, green, clay (CL)
Slip plane-Strike S35E, dip 18 S

Dense, slightly damp, brown-green, fine sand (SP)

Firm, damp, green, clay (CL)
Slip Plane-Strike N35E, dip 18S

Med. dense, dry, light green-brown, med. sand (SW)

Dense, slightly damp, brown, silt & sand (ML-SW)

Dense, slightly damp, green-brown, silt & med. to coarse sand (ML-SW)

Med. dense, dry, light green-brown, med. coarse sand (SW)
S=95% G=5%

S=80% G=20%

Boring No. 11 continued

LEGEND

① Undisturbed Sample
◎ Disturbed Sample
Water Table
(SM) Unified Soil Classification

Job No. 73-3706
Figure No. V

BORING SUMMARY SHEET

Boring No 11 (cont'd) Elevation ___

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft.	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement(-) % swell (+)
		Becomes damp					
45	Ⓒ						
50		Med. dense, damp, light pinkish-brown, med. coarse sand w/ some gravel (SW) Bottom of Hole					

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

▽ Water Table

(SM) Unified Soil Classification

Job No. 73-3706
Figure No. VI

BORING SUMMARY SHEET

Boring No 12 Elevation ____

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (–) % swell (+)
	◎	Med. dense, dry, light green, fine sand (SP)					
5		Dense, slightly damp, green-brown, silt & fine sand (SM)					
10	◎	Med. dense, dry, light green-brown, med. to coarse sand (SW)					
15	◎	Med. dense, dry, light gray-brown, med. coarse sand & rounded gravel to 3" (SW)					
20	◎	Med. dense, dry, light gray-brown, med. to coarse sand & gravel (SW)					
25		Med. dense, damp, green-brown, med. sand & gravel to 6" S=90% G=10%					
	◎	Med. dense, slightly damp, white, med. sand (SW)					
30 35	◎	Med. dense, damp, light brown, med. sand (SW) Cobbles to 12" Bottom of Hole					

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

▽ Water Table

(SM) Unified Soil Classification

Job No. 73-3706
Figure No. VII

BORING SUMMARY SHEET

Boring No 13 Elevation ____

DEPTH IN FEET	SAMPLE NO.	Description	DRY DENSITY lbs/cu ft.	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (–) % swell (+)
		Dense, damp, green-brown, silt & fine sand (ML-SP)					
5		Slip Plane-Strike N45W, dip 50S					
		Dense, dry, light brown-green, silt & fine sand (ML-SP)					
10		Med. dense, dry, tan, fine sand (SP)					
15 20		Med. dense, slightly damp, brown, dirty silt & fine sand (SM)					
25		Med. dense, slightly damp, green-brown med. sand w/ some fines (SW)					
30		Med. dense, slightly damp, white fine sand (SP)					
35		Med. dense, dry, light gray-green, med. coarse sand & some fines (SW) Bottom of Hole					

LEGEND

① Undisturbed Sample

◯ Disturbed Sample

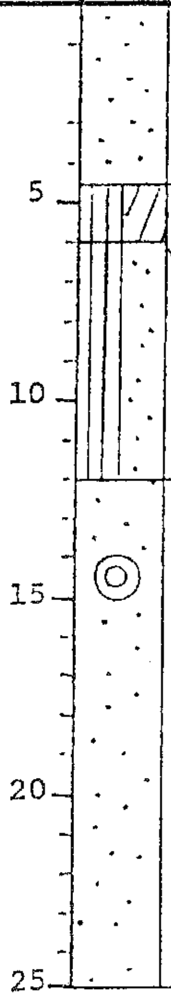
Water Table

(SM) Unified Soil Classification

Job No. 73-3706
Figure VIII

BORING SUMMARY SHEET

Boring No 14 Elevation ____



DEPTH IN FEET	SAMPLE NO		DRY DENSITY lbs/cu ft.	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft-kips/ft	% settlement(-) % swell (+)
		Dense, dry, white, fine sand (SP)					
5		Dense, damp, dark green-brown, clayey siltstone (ML)					
10		Dense, slightly damp, light gray-brown, silt & fine sand (SM)					
15	◎	Dense, slightly damp, green-brown, fine sand (SP)					
25		Bottom of Hole					

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

Water Table

(SM) Unified Soil Classification

Job No. 73-3706
Figure No. IX

BORING SUMMARY SHEET

Boring No 15 Elevation ___

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (-) % swell (+)
		Med. dense, slightly damp, brown, silt & sand w/ pebbles (ML-SW)					
5		Stiff, damp, brown, sandy clay w/ caliche & pebbles (CL)					
10		Med. dense, slightly damp, brown, clayey silt, sand, gravel & a few large cobbles (ML-SC) Si=40% Sa=40% G=15% C=5%					
		Med. dense, slightly damp, gray-brown silt & fine sand, much caliche (ML-SP					
15		Med. dense, slightly damp, dark brown silt & sand (ML-SW)					
20		Med. dense, slightly damp, brown, silty sand & gravel (SM)					
25		Med. dense, slightly damp, red-brown, silty med. sand & gravel Si & Sa=60% G=40%					
		Med. dense, slightly damp, red-brown, silty sands, gravels & cobbles to 12" B.H.					

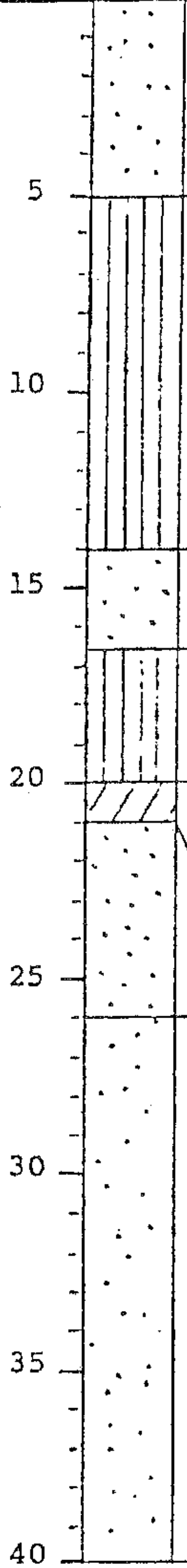
LEGEND

①	Undisturbed Sample	⊽	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 73-3706
Figure No. Y

BORING SUMMARY SHEET

Boring No 16 Elevation ____



DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement(-) % swell (+)
		Dense, damp, light gray-brown, fine sand (SP)					
		Dense, slightly damp, gray-brown, fine sandy siltstone (ML)					
		Med. dense, slightly damp, white fine sand (SP)					
		Dense, slightly damp, gray-brown, fine sandy siltstone (ML)					
		Hard, slightly damp, red-brown, claystone (CL)					
		Dense, slightly damp, light gray-brown silty fine sandstone (SM)					
		Material falls from bucket as sand as opposed to blocks. Boring No. 16 continued					

LEGEND

① Undisturbed Sample
◎ Disturbed Sample
Water Table
(SM) Unified Soil Classification

Job No. 73-3706
Figure No. XI

BORING SUMMARY SHEET

Boring No 16 (cont'd) Elevation ___

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement(-) % swell (+)
		Small amounts of claystone, continuing into silty fine sand					
45		Slip Plane on bentonite approx. horizontal					
		Med. dense, damp, white, fine clean well sorted sand (SW)					
		Hard, damp, brown, clay grading to brown, hard, siltstone (CL-ML)					
50		Med. dense, damp, tan, sandstone, (fine well sorted) (SW)					
55		Becomes dense, interbedded siltstone, claystone & fine sandstone					
		4" clay bed					
60		Some shiny parting surfaces					
		Med. dense, slightly damp, light brown, clean fine to med. sand (SW)					
65		Very dense, slightly damp, light gray-brown, sandstone (SW) B.H.					

LEGEND

① Undisturbed Sample

◯ Disturbed Sample

Water Table

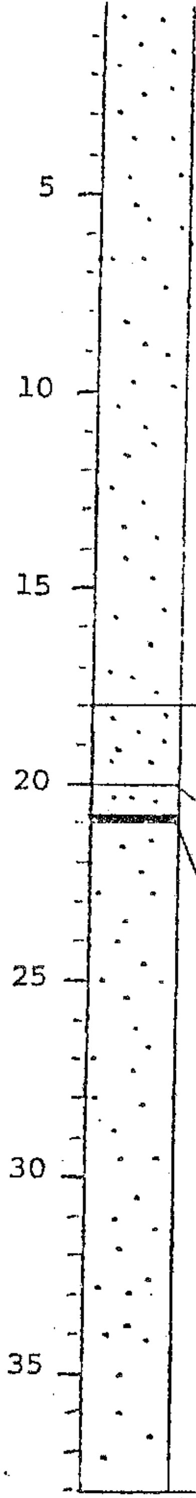
(SM) Unified Soil Classification

Job No. 73-3706

Figure No. XII[illegible]

BORING SUMMARY SHEET

Boring No 17 Elevation ___



Description	DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement(−) % swell (+)
Med. dense, damp, brown, green-tan, fine to med. sand (SP)					
Loose, damp, brown, med. coarse, sand & gravel S=90% G=10%					
Loose, damp, light gray-brown, clean fine sand (SP) Slip Plane (horiz)					
Loose, damp, brown, med. coarse sand (SW)					
Bottom of Hole					

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

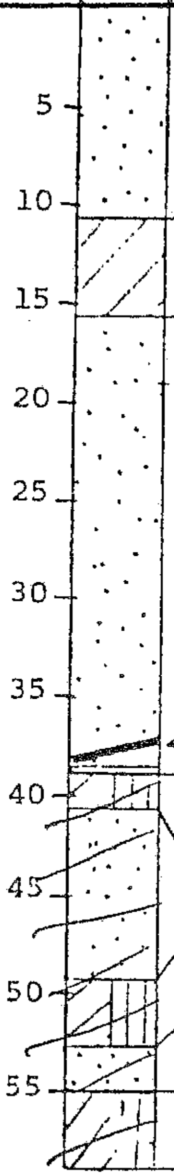
Water Table

(SM) Unified Soil Classification

Job No. 73-3706
Figure No. XIII

BORING SUMMARY SHEET

Boring No 18 Elevation ___



DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft.	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft.	% settlement (–) % swell (+)
		Dense, slightly damp, light gray-green, silty fine sand (SP)					
		Hard, moist, brown, claystone (CL) becoming clayey siltstone (ML)					
		Dense, damp, brown, silty fine sandstone (SW) N55E, 10°N Slip plane on 8"bentonite bed					
		Very dense, damp, dark green-brown, clayey siltstone (ML).					
		Very dense, damp, green-brown, fine sandstone (SW)					
		Dense, damp, dark green-brown, clayey siltstone (ML)					
		Dense, damp, green-brown, fine sand (SP)					
		Very hard, damp, dark brown, claystone & clayey siltstone (CL-ML) B. H.					

LEGEND

①	Undisturbed Sample	≡	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 74-4180
Figure No. I

BORING SUMMARY SHEET

Boring No 19 Elevation ___

DEPTH IN FEET	SAMPLE NO		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement (−) % swell (+)
5		Hard, damp, brown & red-brown, siltstone & claystone (ML-CL)					
10 15 20		Dense, damp, light green-brown, fine sand (SP)					
25		Dense, damp, pink-gray, fine sand (SP) Slip plane in bentonite-N45W, 4°S					
		Hard, damp, green, very sandy claystone (CL)					
30		Dense, damp, light green-gray, clayey sandstone (SC)					
35 40		Dense, damp, green-brown, sandstone (SW) Bottom of Hole					

LEGEND

①	Undisturbed Sample	≡	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 74-4180
Figure No. III

BORING SUMMARY SHEET

Boring No 20 Elevation ___

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft.	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft	% settlement(-) % swell (+)
		Very hard, damp, dark brown, claystone (CL)					
5							
10		Dense, damp, green-brown, silty fine sand (SP)					
15							
20		Hard, damp, brown, claystone (CL)					
25							
30		Very dense, damp, green-brown, fine sand (SP)					
35							
40							
45		Dense, damp, light brown, silty fine sand (SP)					
50							
55		Slip Plane- 6"shear zone N65E,13S					
60		Dense, damp, green-brown, sandy claystone (CL)					
65							
70							
75							
80		Dense, damp, light brown, silty fine sand (SP)					
		Shear Zone-2'thick -- remolded clay					

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

Water Table

(SM) Unified Soil Classification

Job No. 74-4180
Figure No. V

BORING SUMMARY SHEET

Boring No 21 Elevation ____

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft. kips/ft	% settlement (−) % swell (+)
		Dense, damp, light brown, silty fine sand (SP)					
5							
		Dense, damp, green-brown, siltstone (ML)					
10							
15		Dense, damp, light brown, silty fine sand (SP)					
		horizontal bedding					
20		←Slip Plane-N5E,33E					
		bedding N15E,13E					
25							
		←Slip Plane-N35W,22N					
30		Hard, damp, green-brown, silty claystone (CL) bedding N45E,6SE					
35		Dense, light brown, fine sand (SP)					
40		Dense, damp, green-brown, clayey-siltstone (ML)					
45		bedding N55E,7SE Dense, damp, darker green-brown, silty fine sandstone (SW)					
50		claystone					
55							
		Hard, pink, sandy bentonite					
60							
		offset bentonite bed (secondary shearing)					
65							
		Hard, damp, dark brown, fine sandy claystone (CL)					
50							
		Horizontal bedding					
75							
		←Slip Plane-in bentonite N5W,4W					

LEGEND

① Undisturbed Sample

◎ Disturbed Sample

Water Table

(SM) Unified Soil Classification

Job No. 74-4180
Figure No. II

BORING SUMMARY SHEET

Boring No 22 Elevation ____

DEPTH IN FEET	SAMPLE NO.		DRY DENSITY lbs/cu ft	IN PLACE MOISTURE, % of dry weight	SHEAR RESISTANCE kips/sq ft	DRIVE ENERGY ft kips/ft.	% settlement (–) % swell (+)
		Med. dense, damp, light brown, silty fine sand (SP)					
5							
10		Med. dense, slightly damp, light gray-brown, fine sand (SP)					
15							
20							
		←Slip Plane-N25W,18E					
25		Brown, bentonite & caliche over plane, 6" disturbed sand under plane					
30		Med. dense, slightly damp, light brown silty fine sand w/caliche & rounded cobbles to 6" (SP)					
35		Slip Plane- N-S,19W Dense, slightly damp, light gray-brown, fine sand (SP)					
40		bedding- N55E,27N					
45		Hard, damp, gray-pink, sandy bentonite Slip Plane-N70E,3S					
50							
55		Med. dense, slightly damp, green-brown silty sand (SM)					
60		Dense, slightly damp, brown, silty clayey fine sand (SC) becoming cleaner @ 61'					
65		Clean, light gray-brown, sandstone (SW) bedding-N20W,4E					
70							
75		Dense, damp, brown, interbedded siltstone & claystone (ML-CL) Bedding N30E,4E					
80		←Slip Plane-N15E,4W in bentonite horizontal bedding Bottom of Hole @ 90'					

LEGEND

①	Undisturbed Sample	≡	Water Table
◎	Disturbed Sample	(SM)	Unified Soil Classification

Job No. 74-4180
Figure No. IV

GEOTECHNICAL INVESTIGATION
BEYER HILL PARK APARTMENTS
SAN YSIDRO, CALIFORNIA

By: San Diego Geotechnical Consultants, Inc.

June, 1988

DATE OBSERVED: 11-14-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 202± LOCATION: See Geotechnical Map

BORING NO. 1

KELLY WEIGHT (lbs.) 4113

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0	SM						FILL: Light gray silty fine SAND, damp to moist, medium dense to loose.	
	SM						TERRACE DEPOSIT (Qt): Light gray brown to orange brown silty fine to coarse SANDSTONE with abundant cobbles up to 24" in diameter, moist, medium dense, massive. Contact: somewhat gradational, approximately horizontal.	
5	SM/ML	5	⧄		32.4	88.4	SAN DIEGO FM (Tsd): Olive gray silty fine SANDSTONE to sandy SILTSTONE with some clay, moist, very dense/hard, massive.	
10 15	SM/ML	8/10"	⧄	☒			@ 7'-8' olive gray silty CLAYSTONE, moist, hard, somewhat fractured (about 2"-4" spacing) with some orange stain in fractures. Top contact: gradational, approximately horizontal. Bottom contact: undulating, dips roughly 3° NW, some polished surfaces, 1/8" remolded seam at bottom contact. White cemented SANDSTONE to SILTSTONE, some caliche. @ 10½'-12½' light gray clayey to silty fine SANDSTONE, moist, medium dense, massive. Top contact: N54W/5N, bottom contact: irregular, undulating.	
	MH			☒			@ 13' clay seam, irregular, undulating, 1/8" to 3" thick, approximately N12E/12E Contact: somewhat remolded, N11W/12W	Particle Size Analysis Atterberg Limits Remolded Direct Shear
20	ML	3	⧄	☒	32.3	88.3	Olive SILTSTONE, moist, highly fractured with abundant polished surfaces, firm to stiff. Contact: N72E/4N Gray clayey SILTSTONE with slight sand, moist, hard, massive, with spherical orange stains to ¼" diameter. @ 23' Joint: N74E, approximately vertical, 1/16" caliche infill. Contact: gradational over 18"	Particle Size Analysis Atterberg Limits Undisturbed Direct Shear
25 30 35 40	SM	7	⧄		16.0	114.9	Light gray silty fine SANDSTONE, moist, medium dense to dense, massive. @ 28'-29' becomes very silty, light olive brown, dense to very dense @ 29'-30' sandy siltstone, gradational contacts, hard @ 33'-40' Cobblezone, cobbles to 6" diameter, sand becomes somewhat friable. Bedding: roughly horizontal @ 34' Bedding: N10E/6E @ 39'-40' orange staining, fine to coarse sand @ 40' Bedding: N30E/8W	@ 25' Kelly Weight becomes 2981 lbs.

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-2

DATE OBSERVED: 11-14-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 202± LOCATION: See Geotechnical Map

BORING NO. 1

KELLY WEIGHT (lbs.) 2981

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL-TEST
40	SM						SAN DIEGO FM (Tsd): Light gray silty fine SANDSTONE, moist, dense, massive	
		7	⧄	☒				
							@ 44' becomes medium grained, horizontal bedding	
45								
							@ 47½' orange stain N63W/3S	@ 47' Kelly Weight becomes 2168 lbs.
							@ 48'-52' cobble zone, cobbles up to 4" in diameter	
50								
							@ 52' Bedding N34W/4SW @ 52'-54' Light gray very silty very fine SANDSTONE, moist, medium dense to dense, massive, somewhat friable.	
		11	⧄		6.3	108.0		
55							Light gray silty fine SANDSTONE, moist, medium dense, massive, friable	
							@ 56'-58' faint, micaceous cross bedding, randomly oriented, horizontal to 15° dips	
60		14	⧄					
							@ 62'-68' slight caving/belling, occasional cobbles up to 18" in diameter, friable sand	
							@ 64'-68' becomes medium to coarse grained	
65								
							@ 68' bedding: E-W/7S, orange stain	
70		20	⧄					
							@ 73'-80' hole bells out to 5' diameter, abundant cobbles to 18", friable sand.	
75								
80							TOTAL DEPTH: 80' No Water Caving/belling @ 73'-80' Geologically logged to 73' Backfilled 11-14-86	

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-3

DATE OBSERVED: 11-17-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 235± LOCATION: See Geotechnical Map

BORING NO. 2

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.) 4113	SOIL TEST
0	ML						SAN DIEGO FM. (Tsd): Light olive gray clayey SILTSTONE with some sand, moist, hard, massive. Contact: slightly undulating N74E/3S, slightly remolded	
	SM						Light gray silty fine SANDSTONE, moist, dense, massive. Contact: N37W,5S	
5	CH ~~CL~~	3	⧄		50.1	71.4	Light olive gray silty CLAY, moist, hard, occasional random polished surfaces. Contact: gradational	Expansion Index
	SM						Light gray silty fine SANDSTONE, moist, dense, massive, somewhat friable. Contact: N27W/6S	Expansion Index Sulfate, pH
	CH			☒				
10	SM	5	⧄		10.3	105.1	Light olive gray CLAYSTONE, moist, stiff to very stiff, somewhat remolded, with slicked surfaces. @ 9½' undulating contact between dark gray clay w/slicks and light gray silty claystone - hard, with some tubular and spherical (to ¼") orange stains. Contact: gradational	Particle Size Analysis Atterberg Limits Undisturbed Direct Shear
15		4	⧄				Light gray silty fine SANDSTONE, moist, dense, massive @ 13' bedding: approximately horizontal @ 18½'-20' scattered claystone inclusions, coarse grained sand	
20		5	⧄		9.8	118.2	@ 21' 6" clay lense, stiff to very stiff, gradational contacts @ 22'-24' coarse grains with gravel, some cobbles to 4" @ 24' bedding: N34W/5S	
25								@ 25' Kelly Weight becomes 2981 lbs.
							@ 29' bedding: N5E/6W	
30		10	⧄				@ 30' grades to coarse grained sand with gravel, some pebbles, friable, caving/belling of hole to 4'-5' diameter.	
35								
40		7	⧄				TOTAL DEPTH: 40' No Water Caving/Belling @ 30'-40' Geologically logged to 24' Backfilled 11-17-86	

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-4

DATE OBSERVED: 11-18-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 267± LOCATION: See Geotechnical Map

BORING NO. 3

DESCRIPTION

KELLY WEIGHT (lbs.) 4113

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)
0	SM					
	CH					
	SM					
5		5	⧄	☒	21.3	99.4
	CL					
	ML					
10		10	⧄		11.4	110.8
	SM/ML					
15		7	⧄			
20		10/9"	⧄	☒		
25						
	CL					
30		8	⧄		23.5	103.2
	SM/ML					
35						
40						

OTAY FM. (To): Light gray silty fine SANDSTONE, moist, dense, massive.
Contact: undulating, approximately N42E/6SE

Olive brown CLAYSTONE, moist, very stiff, with abundant slicked surfaces up to 8" across, in random orientation.
Contact: N42W/10N

Light gray brown silty fine SANDSTONE, moist, very dense, massive, occasional brown claystone inclusions, occasional faint, indistinct bedding.
Contact: Gradational

Medium brown silty CLAYSTONE, moist, very hard, massive, unfractured.
Contact: Gradational

Light gray brown fine sandy SILTSTONE, moist, very hard, massive, unfractured

@ 10'-10½' cemented lense

@ 10½' 2" clay bed, hard, slightly softer for 1/16" at bottom contact, N25W/4E

Light gray brown silty fine SANDSTONE/ sandy SILTSTONE, moist, very dense, massive, unfractured.

@ 12' occasional brown claystone inclusions up to 4" in diameter, hard.

@ 14' clayey lens, 6" thick, hard, continuous around 1/3 of hole (NE side).

@17½', 1" clay bed, very stiff, occasional polished surfaces, N54W/0-2NE

@ 21', 4" clay bed, hard, horizontal, offset 2" by fault N57W/70SW down to south

@ 23' grades to fine sandy SILTSTONE with slight clay

Contact: Gradational

Medium brown silty CLAYSTONE, moist, hard, massive, unfractured

Contact: Gradational

Light gray brown silty fine SANDSTONE/sandy SILTSTONE, moist, very dense, massive, unfractured, occasional hard clayey lenses up to 5" thick with gradational contacts.

@ 38½'-39½' Light brown claystone bed, hard, some zones slightly bentonitic, unfractured, top contact: N10W/5E, bottom contact: N54E/5S

SOIL TEST

Sulfate, pH

@ 25' Kelly Weight becomes 2981 lbs.

Expansion Index

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-5

DATE OBSERVED: 11-18-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 267± LOCATION: See Geotechnical Map

BORING NO. 3

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.) 2981	SOIL TEST
40	SM/ML	14/9"	⧄		13.1	112.2	<u>QTAY FM. (To):</u> Light gray brown silty fine SANDSTONE/fine sandy SILTSTONE, moist, very dense, massive. @ 43', 4" clayey lens, hard, gradational contacts	
45							@ 46'-48' becomes siltier	@ 47' Kelly Weight becomes 2168 lbs.
50		15/9"	⧄				@ 50' 6" clayey lens, hard, gradational contacts	
							@ 54½', 6" clay bed, hard, approximately horizontal	
55								
60							@ 63' grades to silty fine SANDSTONE	
65								
70		20/8"	⧄		9.6	115.7		@ 72' Kelly Weight becomes 1083 lbs.
							@ 73'-74' silty fine SANDSTONE/fine sandy SILTSTONE	
75							@ 78'-79½', fine to medium grained SANDSTONE, somewhat friable	
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-6

DATE OBSERVED: 11-18-86 **METHOD OF DRILLING:** 30" Bucket Auger

LOGGED BY: RS **GROUND ELEVATION:** 267± **LOCATION:** See Geotechnical Map

BORING NO. 3

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.) 1083	SOIL TEST
80	SM						OTAY FM. (To): Light gray brown silty fine SANDSTONE, moist, very dense, massive @ 79½'-80½' cemented sandstone	
	SM						Light orange brown silty fine to medium SANDSTONE with some coarse, angular, dark grains, moist, very dense, massive, may be grading into the Sweetwater Formation.	
85								
90							TOTAL DEPTH: 90' No Water No Caving Geologically logged to 90' Backfilled 11-18-86	
95								
100								
105								
110								
115								
120								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-7

DATE OBSERVED: 11-19-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 249± LOCATION: See Geotechnical Map

BORING NO. 4

DESCRIPTION

KELLY WEIGHT (lbs.) 4113

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)
0	SM					
	CL					
	SM					
10	ML	4	⧄	☒		
20	ML	9	⧄			
	SM/ML					
30		10	⧄	☒	18.8	108.6

OTAY FM (To): Light gray silty fine SANDSTONE, moist, dense, massive, slight caliche
Contact: N55W/9E

Red brown silty CLAYSTONE, moist, very stiff, massive, moderately fractured (½" spacing), slight green mottling, some caliche blebs, no slicks.

@ 4' grades to green, less fractured (6" spacing), hard, no caliche

@ 5'-6' silty fine sandstone bed, gradational contacts

@ 6½', 5" mottled red zone, moderately fractured, no slicks.
Contact: gradational to interfingering

Light gray to brown silty fine SANDSTONE, moist, dense, massive with occasional faint, indistinct bedding, roughly horizontal.
Contact: undulating, approximately N76E/0-5N

Mottled red brown to green clayey SILTSTONE, moist, hard, somewhat fractured (1"-2" spacing) near contact, less fractured below, no slicks.

@ 11'-12' silty fine sandstone bed, gradational contacts

@ 12' moderately fractured (½"-2" spacing), cemented caliche nodules to 2", very stiff.

@ 15½' fault: slightly remolded, large slicks on surface oriented with dip N30W/55SW. Continues to 19'. 2' silty fine sand bed is offset approximately 1½' in this area, down to SW

Contact: 1/8" remolded clay seam, approximately horizontal

Light gray brown silty fine SANDSTONE/fine sandy SILTSTONE, moist, very dense, massive

@ 22½', 2" brown clayey zone, gradational contacts, roughly horizontal

@ 25', 2"-4" brown claystone bed, horizontal, some caliche

@ 26' becomes light gray fine sandy SILTSTONE, bedding: undulating, roughly N68W/7S

@ 30½', 1" claystone bed, horizontal, hard

@ 33' Bedding: horizontal, 1"-3" claystone, occasionally bentonitic, occasional slick surfaces, discontinuous.

@ 33' becomes light gray brown silty fine SANDSTONE.

@ 35½', 4" brown claystone bed, gradational contacts, approximately horizontal

@ 40' grades to medium gray fine sandy SILTSTONE

SOIL TEST

Expansion Index

Particle Size Analysis
Atterberg Limits
Remolded Direct Shear

@ 25' Kelly Weight becomes 2981 lbs.

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-8

DATE OBSERVED: 11-19-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 249± LOCATION: See Geotechnical Map

BORING NO. 4

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.) 2981	SOIL TEST
40	ML	12	◿		23.2	97.3	OTAY FM. (To): Medium gray fine sandy SILTSTONE, moist, hard, massive @ 42'-43' silty fine sandstone, horizontal @ 45' discontinuous cemented sandstone, 1"-2" thick	Particle Size Analysis Atterberg Limits Undisturbed Direct Shear
45	SM						Below 45' becomes light gray brown to yellow brown silty fine to medium SANDSTONE, very dense, massive, occasional cemented lenses, occasional dark angular grains - may be grading into Sweetwater Formation (Tsw).	@ 47' Kelly Weight becomes 2168 lbs.
50								
55								
60		20	◿		5.0	111.0		
							TOTAL DEPTH: 61' No Water No Caving Geologically Logged to 59' Backfilled 11-19-86	
65								
70								
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-9

DATE OBSERVED: 11-19-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 237± LOCATION: See Geotechnical Map

BORING NO. 5

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.) 4113	SOIL TEST
0	SM						SAN DIEGO FM. (Tsd): Pale yellow green slightly silty fine SANDSTONE, moist, medium dense to dense, massive, @ 3'-6' cobbles up to 5" in diameter, friable fine to coarse sand	
5								
10		3	⧄				@10½-12' fine to coarse sand, pebbles up to 1" in diameter	Sulfate, pH
15							@ 15'-18' occasional cobbles	
20				☒				
25							@ 26'-28' cobbles to 16" @ 28'-31' gravelly coarse sand	@ 25' Kelly Weight becomes 2981 lbs.
30		10	⧄					
35								
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-10

DATE OBSERVED: 11-19-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 237± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	BORING NO. 5 DESCRIPTION KELLY WEIGHT (lbs.) 2981	SOIL TEST
40	SM						SAN DIEGO FM. (Tsd): Pale Yellow green slightly silty fine SANDSTONE, moist, dense massive. @ 41' refusal on cobble layer	
							TOTAL DEPTH: 41' No Water No Caving Backfilled 11-20-86	
45								
50								
55								
60								
65								
70								
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-11

DATE OBSERVED: 11-20-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 237± LOCATION: See Geotechnical Map

BORING NO. 6

DESCRIPTION

KELLY WEIGHT (lbs.) 4113

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0	SM						SAN DIEGO FM. (Tsd): Light yellow brown silty fine to coarse SANDSTONE, moist, medium dense, massive @ 2' grades to light gray green, slightly silty @ 4'-5' becomes gravelly	
5							@ 5'-8' cobbles to 6" in diameter, friable coarse sand @ 8'-11' silty fine sand, top contact: channel cut, N25E/20E	
10							@ 11'-12' cobbles to 3", friable fine sand @ 12'-13½' white silty fine sand, friable, indistinct cross bedding dips 0-10 towards SE @ 13½-17' Light gray green silty fine to coarse sand, some cobble stringers, friable	
15							@ 16'-17' cross bedding: N80E/10S, N5E/7W, E-W7N @ 17'-19' silty fine sand, faint micaceous cross bedding @ 19'-29' fine to coarse sand, friable, faint discontinuous cross beds	
20							@ 20' cross bed: N65W/10S @ 21' bedding: N35W/3SW @ 24' cross bedding N83W/11S	
25							@ 29'-31' cobbles up to 18" in diameter, boring bells out	
30				☒			@ 31'-42' silty fine sand, massive, occasional cobble stringers	
35								
40							@ 40' orange stained cross bed N78W/10S	

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-12

DATE OBSERVED: 11-20-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 237± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	BORING NO. 6 DESCRIPTION KELLY WEIGHT (lbs.) 2981	SOIL TEST
40	SM						SAN DIEGO FM. (Tsd): Light gray green silty fine SANDSTONE, moist, dense, massive @ 42' fine to coarse sand, friable @ 44'-46' cobbles to 18", friable, hole bells out @ 46' refusal on cobbles	
45								
							TOTAL DEPTH: 46' No Water No Caving Geologically logged to 42' Backfilled 11-20-86	
50								
55								
60								
65								
70								
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-13

DATE OBSERVED: 11-12-86 **METHOD OF DRILLING:** 30" Bucket Auger

LOGGED BY: RS **GROUND ELEVATION:** 276± **LOCATION:** See Geotechnical Map

BORING NO. 7

DESCRIPTION

KELLY WEIGHT (lbs.) 4113

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0	SM						OTAY FM: (To): Light gray silty fine SANDSTONE, moist, dense, massive	
							@ 4'-6½' fault: N5E/78E, 18" thick roughly horizontal (gradational, undulating) clay bed is offset 12", down to E, clay is very stiff to hard, highly to slightly fractured.	
5							@ 6½'-10', 1/16" to 1/4" clay filled fractures in sandstone, at 1' spacing around hole. Undulating, steeply dipping, N60E/75NW, N48E/77SE, N5E/Vertical. May be continuation of fault above.	
10	CH	4	⧄	☒	32.6	89.4	@ 10', 6"-12" clay bed N10W/13W, offset 8" by fracture N35E/70SE, down to SE. Olive brown clay, moist, stiff, with abundant slicks, caliche blebs, somewhat remolded	Expansion Index Particle Size Analysis Atterberg Limits
				☒			@ 10'-13' shear zone, intermixed sandstone lenses (to 12" thick) and slightly remolded, highly fractured, slicked, claystone stringers to 3" thick: N15W/50E, N10W/57E, N35W/77E	Expansion Index Atterberg Limits Remolded Direct Shear
15	ML/SM						@ 13'-13½' pink bentonitic clay, remolded at bottom contact.	
							Contact: slightly undulating, N63W/5SW	
							Light gray fine sandy SILTSTONE/silty SANDSTONE, damp, very dense, massive	
20		7	⧄		17.4	109.5	@ 16½', 1" clayey siltstone bed, hard, unfractured, N7W/7E	Sulfate, pH
							@ 21½', 6" brown claystone bed, hard, unfractured, horizontal	
25								@ 25' Kelly Weight becomes 2981 lbs.
30		10/11"	⧄		11.8	118.3	@ 30', 6" clayey siltstone bed, hard to cemented, N-S/5E.	
							@ 33' grades to silty fine SANDSTONE	
35								
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-14

DATE OBSERVED: 11-21-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 276± LOCATION: See Geotechnical Map

BORING NO. 7

DESCRIPTION

KELLY WEIGHT (lbs.) 2981

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
40	SM	15/10"	⧄		5.0	105.1	OTAY FM. (Ts): Light gray silty fine SANDSTONE, damp, very dense, massive	
45							Contact: Gradational	
	ML						Medium gray brown clayey SILTSTONE, damp, hard, massive, unfractured	@ 47' Kelly Weight becomes 2168 lbs.
50		20/10"	⧄					
							Contact: Gradational	
	SM						Light gray brown silty fine SANDSTONE, damp, very dense, massive	
55							Contact: Undulating, approximately horizontal	
	ML						Medium gray brown clayey SILTSTONE, damp, hard, massive unfractured.	
60				☒				
							TOTAL DEPTH: 61' No Water No Caving Geologically logged to 60' Backfilled 11-21-86	
65								
70								
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-15

DATE OBSERVED: 11-21-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 271± LOCATION: See Geotechnical Map

BORING NO. 8

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.) 4113	SOIL TEST
0	SM						FILL: Light gray brown silty fine SAND, moist, dense, massive, with occasional sandstone and claystone inclusions to 6".	
	CL						@ 3'-3½' abundant clay inclusions to 1" in diameter	
5	SM						OTAY FM. (To): claystone, hard, N14E/6W, also tight fractures: N75E/63S Contact: N14E/6W	
							Light gray SANDSTONE, damp, dense to very dense, massive	
10	CH		⧄		30.9	88.3	@ 6', 1" claystone bed, N5E/5W, hard @ 6½' fracture in sandstone, E-W/68S	
	SM	4					Contact: 1/8" remolded clay seam N15W/5W	Expansion Index
	SM/ML						Olive brown CLAYSTONE, moist, very stiff, highly fractured, slicks Contact: Gradational, clay becomes hard, less fractured.	
15							Light gray sandstone, dense, wide spaced fractures. @ 11½', 1" claystone bed, hard, unfractured, overlying discontinuous 2" cemented zone with discontinuous ½" remolded clay seam. Contact: Gradational to undulating	
20		8/10"	⧄				Light gray brown silty fine SANDSTONE, damp, very dense/hard, massive, unfractured. @ 18', 1" brown claystone bed, hard, unfractured, horizontal	
25							@ 21' grades to silty fine SANDSTONE @ 22' clayey bedding, horizontal	@ 25' Kelly Weight becomes 2981 lbs.
							@ 28' grades to fine sandy SILTSTONE with slight clay	
30		15/10"	⧄		12.1	114.2	@ 30½' grades to silty fine SANDSTONE/fine SILTSTONE @ 33' grades to silty fine SANDSTONE	
35								
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-16

DATE OBSERVED: 11-21-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 271± LOCATION: See Geotechnical Map

BORING NO. 8

KELLY WEIGHT (lbs.) 2981

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
40	SM	10/10"	/		4.3	104.3	OTAY FM. (To): Light gray brown silty fine SANDSTONE, damp, very dense, massive	
							TOTAL DEPTH: 41' No Water No Caving Geologically logged to 39' Backfilled 11-21-86	
45								
50								
55								
60								
65								
70								
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-17

DATE OBSERVED: 12-22-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 124 ± LOCATION: See Geotechnical Map

BORING NO. 9

DESCRIPTION

KELLY WEIGHT (lbs.) 2218

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0	SM						FILL: Light brown silty fine SAND, moist, loose to medium dense.	
	SM						SAN DIEGO FM. (Tsd): Light gray green silty fine to coarse SANDSTONE with cobbles up to 18" in diameter, moist, medium dense, massive, friable.	
5							@ 3' grades to fine grained sandstone, no cobbles, yellow stained bedding dips 0-2 to SW	
							@ 8', 1" siltstone bed, hard, unfractured, N15E/2-3W	
10							@ 10', becomes less friable, medium dense to dense	
		7					@ 12'-13', abundant broken sea shells, top contact: horizontal, bottom contact: N10W/8W	
15							@ 15' cemented lens, 2" thick, NE quarter of boring, approximately horizontal	
							@ 18', 6" broken sea shell bed, N77E/2N	
20								
							@22'-25' abundant broken sea shells	
25							@ 25' bedding: approximately horizontal	@ 24' Kelly Weight becomes 1358 lbs.
							@ 28'-31' faint, discontinuous cross bedding	
30								
35		8						
							TOTAL DEPTH: 36' No Water No Caving Geologically logged to 34' Backfilled 12-22-86	
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-18

DATE OBSERVED: 12-23-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 230± LOCATION: See Geotechnical Map

BORING NO. 10

KELLY WEIGHT (lbs.) 2218

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0	SM						SAN DIEGO FM.: Light gray green silty fine SANDSTONE, damp, medium dense Contact: irregular, undulating, 2"-4" remolded clay at contact	
	ML/CH						Light olive gray sandy to clayey SILTSTONE intermixed with olive yellow to brown clay lenseš - clay is commonly remolded or slickéd with fine root hairs on polished surfaces. Clay/siltstone contacts are often faults/fractures: N3W/57E, N23W/71E, N15W/73E, N10E/Vertical. Contact: E. side of boring N10W/60E, W. side of boring - gradational.	
5	SM	4	▨				Light gray green slightly silty fine SANDSTONE, damp, medium dense to dense, massive. @ 5.5' friable sand, 3" thick, approximately horizontal on W. side of boring, cut off by above contact on E. side of boring.	
10							@ 11' grades to fine to coarse sandstone with some gravel. @ 13' grades to very silty fine sandstone.	
15		7	▨	☒			@ 15' grades to fine to coarse sandstone, indistinct cross beds dip roughly 15° to N. @ 17'-18' pebbles up to 3" in diameter. @ 18' becomes light gray silty fine sandstone, bedding: N32E/12N @ 20' fine to medium sandstone, N20E/12W offset 2" by fracture/fault N30W/70W, down to W.	
20							@ 23'cobbles up to 4" in diameter	
25							@ 25' to approximately 35', caving/belling of boring to 8' wide in direction of N30E.	
30		10	▨					
35								
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-19

DATE OBSERVED: 12-23-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 230 ± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	BORING NO. 10 DESCRIPTION KELLY WEIGHT (lbs.) 1358	SOIL TEST
40	SM						SAN DIEGO FM.: Light gray green fine to medium SANDSTONE with slight silt, damp, medium dense to dense, friable. @ 43'-50' boring bells out	
45							@ 47'-50' cobbles to 12" diameter	
50							@ 50'-55' fine sandstone with occasional gravel sized grains	
55								
60							@ 59'-61' sandstone is olive brown	
65				☒				
70							TOTAL DEPTH: 70' No Water Caving/belling @ 25'-35' and 43'-50' Geologically logged to 26' Backfilled 12-23-86	
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-20

DATE OBSERVED: 12-24-86 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 277± LOCATION: See Geotechnical Map

BORING NO. 11

DESCRIPTION

KELLY WEIGHT (lbs.) 2218

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0	SM						OTAY FM.(To): Light gray silty fine SANDSTONE, damp, dense to very dense, massive.	
5		10	⧄					
10		10	⧄					
15							@ 15'-18.5' scattered claystone inclusions to 1/4"	
				☒			@ 18.5' 3" olive brown clay bed, hard, with a 1/8" remolded seam in center of bed, bedding: N71E/8S	
20		3	⧄	☒			@ 19.5' 3" olive brown clay bed, occasionally bentonitic, occasionally remolded with slicks, bedding: undulating, approximately N57E/5S @20'-21' pink bentonitic clay, hard, 2" remolded zone at bottom contact. Contact: approximately horizontal	
	ML						Olive gray SILTSTONE, damp, hard, massive.	@ 24' Kelly Weight becomes 1358 lbs.
25							Gradational contact	
30	SM	20	⧄				Light gray silty fine SANDSTONE, damp, very dense, massive Gradational contact	
	ML						Olive gray clayey SILTSTONE, damp, hard, massive	
35							Gradational contact	
40	SM						Light gray silty fine SANDSTONE, damp, very dense, massive	

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-21

DATE OBSERVED: 1-2-87 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 253 ± LOCATION: See Geotechnical Map

BORING NO. 12

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION KELLY WEIGHT (lbs.)	SOIL TEST
0	ML						OTAY FM. (to): Light gray brown fine sandy SILTSTONE, damp, hard, massive. @ 2' brown clayey siltstone, 3" thick, N27W/5W @ 2.5' brown clayey siltstone lens, approximately horizontal	
5							@ 5.5' grades to gray brown SILTSTONE, with slight clay, hard, massive, some micaceous grains	
							@ 8' red stain 1/8"-1/2" thick, approximately horizontal, occasional slicked surfaces just above this @ 8'-8.5' slight red mottling Gradational contact	
10	SM						Light gray brown silty fine SANDSTONE, damp, very dense, massive. @ 11', 1" claystone bed, hard, unfractured, N70E/6S @ 14', 6" claystone bed, hard, unfractured, top contact: N45W/8SW. Bottom contact: E-W/8S @ 16.5', 6" siltstone bed, N30W/0-2W	
15								
20								
25								
30							Contact: horizontal	
	ML						Gray brown clayey SILTSONE, damp, hard, massive.	
35							Contact: approximately horizontal, offset 3" by fault/fracture N50W/62 SW, down to SW	
	SM						Light gray brown silty fine SANDSTONE, damp, very dense, massive @ 37.5', 2" siltstone bed, approximately horizontal, offset 3" by same fault/fracture as above - N50W/62SW, down to SW	
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-23

DATE OBSERVED: 1-2-87 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 253 ± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	BORING NO. 12 DESCRIPTION KELLY WEIGHT (lbs.)	SOIL TEST
40	SM						OTAY FM. (To): Light gray brown silty fine SANDSTONE, damp, very dense, massive @ 41', 3" claystone bed, hard, unfractured, horizontal Gradational contact	
	ML						Gray brown clayey SILTSTONE, damp, hard, massive	
45								
							@ 47', 1/8'-1/2' clay bed, hard, horizontal 2" clay bed @ contact, horizontal, slightly bentonitic, hard, unfractured.	
50	SM						Light gray brown silty fine SANDSTONE, damp, very dense, massive @ 51.5'-52.5', siltstone bed, hard, horizontal	
55								
							TOTAL DEPTH: 57' No Water No Caving Geologically logged to 55' Backfilled 1-2-87	
60								
65								
70								
75								
80								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-24

DATE OBSERVED: 1-2-87 METHOD OF DRILLING: 30" Bucket Auger

LOGGED BY: RS GROUND ELEVATION: 264 ± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	BORING NO. 13 DESCRIPTION KELLY WEIGHT (lbs.)	SOIL TEST
0	SM						OTAY FM. (To): Light gray brown silty fine SANDSTONE, damp, dense, massive @ 0'-3' caliche filled fracture, 1/2' thick, N28E/70NW. Irregular contact, partly offset by fracture/fault above.	
	ML						Gray brown fine sandy SILTSTONE, damp, hard, massive, occasionally fractured @ 6"-12" spacing, some clay @ 6', 1" claystone bed, hard, unfractured, horizontal @ 7'-8' claystone, hard, somewhat fractured (6" spacing) horizontal Undulating contact	
5								
10	SM						Light gray brown silty fine SANDSTONE, damp, very dense, massive.	
15								
20							TOTAL DEPTH: 19' No Water No Caving Geologically logged to 17' Backfilled 1-2-86	
25								
30								
35								
40								

JOB NO.: 05-6738-001-00-00

LOG OF BORING

FIGURE: B-25

DATE OBSERVED: 01-02-87 METHOD OF DRILLING: Case Tracked Hoe
24" Bucket
LOGGED BY: PAT GROUND ELEVATION: 210± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	TEST PIT NO. 1 DESCRIPTION	SOIL TEST
0 5							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
							ALLUVIUM (Qal): Light brown sandy SILT with cobbles, damp, loose, some caving	
10							OTAY FM. (To): Light brown sandy SILTSTONE, damp, dense, massive	
15							TOTAL DEPTH: 12' No Water Caving at 7'-9' Backfilled 1-2-87	

LOGGED BY: PAT GROUND ELEVATION: 210± LOCATION: See Geotechnical Map

							TEST PIT NO. 2	
0							COLLUVIUM (Qcol): Medium brown silty CLAY with cobbles, moist, soft	
5							OTAY FM. (To.): Light brown sandy SILTSTONE, moist, dense, thinly laminated cross bedding @ 3' horizontal clay bed, 2" thick, hard @ 3½' horizontal clay bed, 2" thick, hard @ 6' joint, N-S.vertical	
10 15							TOTAL DEPTH: 8' No Water No Caving Backfilled 1-2-87	

JOB NO.: 05-6738-001-00-00

LOG OF TEST PIT

FIGURE: B-26

DATE OBSERVED: 1-2-87 **METHOD OF DRILLING:** Case Tracked Hoe
24" Bucket

LOGGED BY: PAT **GROUND ELEVATION:** 212± **LOCATION:** See Geotechnical Map

TEST PIT NO. 3

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0							COLLUVIUM (Qcol): Dark brown silty CLAY with cobbles, moist, soft	
5							WEATHERED BEDROCK: Light brown sandy SILTSTONE, moist, loose, caliche stringers, fractured/brecciated	
							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, some caliche stringers	
10							@ 6' horizontal clay seam, 3" thick	
							TOTAL DEPTH: 9' No Water No Caving Backfilled 1-2-87	
15								

LOGGED BY: PAT **GROUND ELEVATION:** 216± **LOCATION:** See Geotechnical Map

TEST PIT NO. 4

0							COLLUVIUM (Qcol): Dark brown sitly CLAY with cobbles, moist, soft @ 3' loose sand lens with cobbles	
5							OTAY FM. (To): Light brown sandy siltstone, moist, dense, thinly laminated @ 5½' joint, N-S/vertical @ 6' horizontal bedding	
10							TOTAL DEPTH" 7½' No Water No Caving Backfilled 1-2-87	
15								

JOB NO.: 05-6738-001-00-00 **LOG OF TEST PIT** **FIGURE:** B-27

DATE OBSERVED: 1-2-87 **METHOD OF DRILLING:** Case Tracked Hoe
24" Bucket

LOGGED BY: PAT **GROUND ELEVATION:** 210± **LOCATION:** See Geotechnical Map

TEST PIT NO. 5

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
5							ALLUVIUM (Qal): Light brown sandy SILT with cobbles, damp, loose	
10							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, thinly laminated	
15							TOTAL DEPTH: 13' No Water No Caving Backfilled 1-2-87	

LOGGED BY: PAT **GROUND ELEVATION:** 216± **LOCATION:** See Geotechnical Map

TEST PIT NO. 6

0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
5							OTAY FM. (To): Light brown sandy SILTSTONE, top one foot is weathered-loose with caliche stringers, then becomes moist, dense, thinly laminated @ 3' horizontal clay bed, 2" thick, hard @ 3½' horizontal clay bed, 2" thick, hard @ 5' joint, N15 E/vertical	
10							TOTAL DEPTH: 6' No Water No Caving Backfilled 1-2-87	
15								

JOB NO.: 05-6738-001-00-00 **LOG OF TEST PIT** **FIGURE:** B-28

DATE OBSERVED: ______ METHOD OF DRILLING: ______

LOGGED BY: ______ GROUND ELEVATION: ______ LOCATION: ______

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	TEST PIT NO. 7 DESCRIPTION	SOIL TEST
0							COLLUVIUM (Qcol): Dark brown silty CLAY with cobbles, moist, soft @ 2'-4' occasional siltstone inclusions @ 4'-5' loose sand lense with cobbles	
5							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, some caliche stringers @ 5½" joint, N3E/vertical	
10							TOTAL DEPTH: 7' No Water No Caving Backfilled 1-2-87	
15								

LOGGED BY: PAT GROUND ELEVATION: 217 ± LOCATION: See Geotechnical Map

DEPTH (FEET)							TEST PIT NO. 8	
0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
							ALLUVIUM (Qal): Light brown silty SAND with cobbles, damp, loose, some caliche stringers	
5								
							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, some caliche stringers	
10							TOTAL DEPTH: 9' No Water No Caving Backfilled 1-2-87	
15								

JOB NO.: 05-6738-001-00-00 LOG OF TEST PIT FIGURE: B-29

DATE OBSERVED: 1-2-87 METHOD OF DRILLING: Case Tracked Hoe

24" Bucket

LOGGED BY: PAT GROUND ELEVATION: 218 ± LOCATION: See Geotechnical Map

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	TEST PIT NO. 9 DESCRIPTION	SOIL TEST
0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
							ALLUVIUM (Qal): Medium brown silty SAND with cobbles, damp, loose	
5							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, some caliche stringers @ 4½' red brown clayey SILTSTONE bed, horizontal	
10							TOTAL DEPTH: 5' No Water No Caving Backfilled 1-2-87	
15								

LOGGED BY: PAT GROUND ELEVATION: 219± LOCATION: See Geotechnical Map

							TEST PIT NO. 10	
0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
							ALLUVIUM (Qal): Medium brown silty SAND with cobbles, moist, dense	
5							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, some caliche	
10							TOTAL DEPTH: 4' No Water No Caving Backfilled 1-2-87	
15								

JOB NO.: 05-6738-001-00-00

LOG OF TEST PIT

FIGURE: B-30

DATE OBSERVED: 1-2-87 **METHOD OF DRILLING:** Case Tracked Hoe
24" Bucket

LOGGED BY: PAT **GROUND ELEVATION:** 229 ± **LOCATION:** See Geotechnical Map

TEST PIT NO. 11

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0 5							COLLUVIUM (Qcol): Dark brown silty CLAY with some cobbles, moist, soft	
10							OTAY FM. (To): Light brown sandy SILTSTONE, moist, top one foot is weathered-loose, fractured, then becomes dense, massive	
15							TOTAL DEPTH: 12' No Water No Caving Backfilled 1-2-87	

LOGGED BY: PAT **GROUND ELEVATION:** 243 ± **LOCATION:** See Geotechnical Map

TEST PIT NO. 12

0 5							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft, some caliche stringers	
10							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, massive, some caliche cementation	
15							TOTAL DEPTH: 12' No Water No Caving Backfilled 1-2-87	

JOB NO.: 05-6738-001-00-00 **LOG OF TEST PIT** **FIGURE:** B-31

DATE OBSERVED: 1-2-87 **METHOD OF DRILLING:** Case Tracked Hoe 24" Bucket

LOGGED BY: PAT **GROUND ELEVATION:** 260± **LOCATION:** See Geotechnical Map

TEST PIT NO. 13

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
							WEATHERED BEDROCK: Light olive-brown sandy SILTSTONE, moist, loose, some caliche stringers.	
5							OTAY FM. (To): Light brown sandy SILTSTONE, moist, dense, massive, some caliche stringers. @ 5' joint, N35W/Vertical	
10							TOTAL DEPTH: 7' No Water No Caving Backfilled 1-2-87	
15								

LOGGED BY: PAT **GROUND ELEVATION:** 240± **LOCATION:** See Geotechnical Map

TEST PIT NO. 14

0							COLLUVIUM (Qcol): Dark brown silty CLAY, moist, soft	
							Light olive brown sandy SILT with cobbles, moist, loose, some orange staining, some caliche stringers	
5								
							@ 9½ dark brown clay lens	
10							OTAY FM. (To): Light olive brown sandy SILTSTONE, moist, dense, massive	
							TOTAL DEPTH: 12' No Water No Caving Backfilled 1-2-87	
15								

JOB NO.: 05-6738-001-00-00 **LOG OF TEST PIT** **FIGURE:** B-32