PRELIMINARY DRAINAGE STUDY
FOR
PHELAN – SEATON
(PRELIMINARY ENGINEERING)
CASE NUMBER: PPT210133

Job Number 1916

July 7, 2021
Revised: September 24, 2021
Revised: January 21, 2022

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Exp. 09/30/2023

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PRELIMINARY DRAINAGE STUDY
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REVISION PAGE

January 21, 2022

This report presents revisions to the previous version of the preliminary drainage study, dated September 24, 2021, to address the comments received from Ms. Han Yang of the Riverside County Flood Control and Water Conservation District (RCFC&WCD). The Flood Control comments were incorporated as part of the Planning Case Progress Report for PPT210133, dated January 3, 2022. This revised report also incorporates minor changes to the site layout but the general drainage management approach still remains similar as the previous version. The drainage study contents have been updated accordingly to be consistent with the current design.

The District's Flood Control related comments are listed below, followed by responses from SDH & Associates, Inc. in **bold** text.

1. Drainage Study: The proposed bioretention facilities (detention basins) are sized to attenuate the 10-year, 24-hour post-project peak flow rate back to the pre-project condition level or less by using HEC-HMS. Please note, the basins shall be sized based on the difference in runoff hydrograph volume between the "developed" condition and the "pre-developed" condition for the 24-hour duration event for the 10-year return frequency, not the 10-year, 24-hour peak flow rate. See comment 015-Flood Increased Runoff Criteria.
    a. Please size the basin following the criteria.
    b. Please submit HEC-HMS model if HEC-HMS will be used for basin sizing.
    c. Revise Sections 4.0 and 5.0 (Pages 15 & 16) accordingly.

    The drainage study was previously prepared to show the peak flow difference between the pre-project and post-project conditions. Pursuant to the comment, the HEC-HMS routing analysis has been revised to summarize the difference in runoff hydrograph volume between the pre-project and post-project conditions for the 10-year, 24-hour storm event. The proposed detention basin (bioretention facility) design has been revised to increase the volume capacity to meet the required 10-year, 24-hour hydrograph volume. In order to achieve the required volume, additional supplemental underground storage volumes have been added underneath parking areas (next to the proposed bioretention facilities). These systems are connected to the aboveground portion of the proposed bioretention facilities multiple via equalizer pipes at elevations equal to the bottom of the proposed basins. The revised HEC-HMS models (electronic files) are included with this revised drainage report. Discussion in Sections 4.0 and 5.0 have been revised accordingly to match the revised modeling results and latest site plan.

2. Drainage study: Please explain why an onsite area south of Subwatershed 100 and east of Subwatershed 200 was not included in pre-development condition. (Page 80-HEC-HMS Workmap).
   Based on my follow-up discussion with Ms. Deborah de Chambeau on January 4, 2022, the pre-project condition on-site area in Basin 200 has been revised to account for the missing area south of Basin 100 and east of Basin 200. The analysis and workmap has been revised accordingly.

3. Drainage Study: Please separate the basin storage volume for water quality and IR mitigation (Pages 84 & 85). Note, the basin volume for water quality treatment should not be included in basin volume for IR mitigation.
   The basin routing analyses have been updated to address this particular comment. As a follow-up to discussion with Ms. Deborah de Chambeau on January 4, 2022, Deborah consulted with Mr. Edwin Quinonez regarding this comment and determine what sections/layers of the bioretention facility could be considered to address the increased runoff mitigation criteria. The direction is that volumes in the subsurface layers (including mulch, bioretention soil mix, and gravel layers) could not be used to address the increase runoff mitigation volume criteria. It is my understanding the reason for the decision is the subsurface layers could be considered "dead storage" in case of potential clogging that could occur. It was clarified that the volumes in the aboveground portion of the bioretention facility could be used to address the criteria. As a result, in order to provide and supplement the volumes needed in the proposed bioretention facilities, the basin grading was adjusted to increase the depths within allowable vertical constraints. However, the volumes in the basins were not enough to meet the required increased runoff mitigation volumes. Hence, additional/supplement underground storage volumes have been added in the parking areas next to the bioretention facilities to help meet this volume criteria. The underground storage facilities are connected via multiple equalizer pipes at invert elevations equal to the bottom of the bioretention facilities. Revised routing analysis results are included in the revised drainage report.

4. Drainage Study: The volume unit for Overall Peak Discharge Summary should be ACRE-FT, not IN (Pages 87 & 92). Please select correct unit for next submittal.
   The HEC-HMS summary table display has been revised to show the units in ACRE-FT, in lieu of IN (inches).

5. Drainage Study: A drainage acceptance letter shall be obtained from the adjacent parcel(s) for the Basin 200 discharge, or the project may need to be re-designed due to lack of adequate outlet.

Based on my discussion with Ms. Deborah de Chambeau on January 4, 2022, it was clarified that a drainage letter would not be needed if the project outlet could be modified to slow down and spread the flow as similar to the pre-project condition. In order to accomplish this goal, the basin outlet pipe from bioretention facility in Basin 200 has been pulled back to the extent possible and an ample amount of riprap energy dissipater has been provided at the toe of the 4:1 fill slope and along the slope in order to slow down and spread the flow before reaching the property boundary. Also, the basin design has been revised to help detain and meet the increased runoff mitigation criteria and the post-project peak flow will be less than the existing condition. Therefore, this should help address the downstream condition of concern and a drainage letter from adjacent property owner should not be necessary.

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September 24, 2021

This report presents revisions to the previous version of the preliminary drainage study, dated July 7, 2021, to address the comments received from Ms. Han Yang of the Riverside County Flood Control and Water Conservation District (RCFC&WCD). The Flood Control comments were incorporated as part of the Planning Case Progress Report for PPT210133, dated September 8, 2021. This revised report also incorporates minor changes to the site layout but the general drainage management approach still remains similar as the previous version. The drainage study contents have been updated accordingly to be consistent with the current design.

The District's Flood Control related comments are listed below, followed by responses from SDH & Associates, Inc. in **bold** text.

1. Drainage Study: The Introduction mentioned the Basin 200 is an underground storage facility to attenuating the 100-year increase flow (Page 4). Please reflect the information and label the Basin 200 as underground basin on the exhibit. The description for Basin 100 is missing; please add it in the study.
   This statement has been corrected in the drainage study. The drainage characteristics section language has been revised to provide further clarity regarding both Basin 100 and Basin 200.

2. Drainage study: The calculations supporting the adequacy of the increased runoff mitigation shall be submitted to the District for review. See comment 015-Flood Increased Runoff Criteria.
   As requested, the preliminary drainage study has been revised to provide the preliminary detention calculation using HEC-HMS for the 10-year, 24-hour storm event/duration, based on the guidelines for the Flood Increased Runoff Criteria. The proposed bioretention facilities (detention basins) have been sized to attenuate the 10-year, 24-hour post-project peak flow rate back to the pre-project condition level or less, in order to address the Flood Increased Runoff Criteria. As suggested in the comment, the detention calculations for the remaining storm events/durations (i.e. – 2-year, 5-year, and 10-year storm events, 1-hour, 3-hour, 6-hour, and 24-hour durations) will be conducted at the time of the final drainage study during the final engineering stage. The results of the preliminary detention calculation are discussed in Section 4.0 and supporting calculation results and exhibits are included in Appendix E.

3. Drainage Study: Per the phone conversation with the engineer, the Basin 200 will be discharging near the southeast corner of the site, directly into the adjacent parcel. Please note the energy dissipater shall be implemented due to the concentration of the flow. The drainage acceptance letter shall be obtained from the adjacent parcel(s) for the Basin200 discharge.

   Runoff from Basin 200 (southerly drainage basin) is expected to drain to the proposed bioretention facility (detention basin) located at the southeasterly corner of the site for treatment and detention purposes, prior to discharging the attenuated flow at the southerly edge of the site. The site plan has been revised to show the proposed energy dissipater (riprap) at the storm drain outfall from the proposed bioretention facility. The runoff at the point of interest will be attenuated (detained back) to the existing condition level or less. And with the incorporation of the energy dissipater, it is anticipated that there will not be negative impacts to the downstream parcel(s) and storm drain systems. Therefore, the project would like to request for a condition of approval without the drainage acceptance letter from the adjacent parcel.

4. Grading Plan: There are two Section B-Bs, one of the section views is missing, please add all section views.

   The section views have been revised accordingly in the Grading Plan.

1.0 INTRODUCTION

1.1 Project Location

This drainage study presents preliminary engineering hydrologic and hydraulic analyses for the proposed Phelan – Seaton project (herein referred to as "the project"). The project is located in the Riverside County (unincorporated area), bounded by Cajalco Road to the north, Seaton Avenue to the west, developed industrial site to the east, and undeveloped parcel to the south. Refer to Figure 1.0 for a Vicinity Map of the project. The APNs are 317-140-019, 020, 005, 004, 028, 044, 045, and 046.

1.2 Project Description

The overall project parcel consists of approximately 17.5 acres with approximately 16.8 acres of on-site drainage management area. The proposed improvements will consist of a tilt-up warehouse building and associated parking areas, sidewalks, and landscape areas. The proposed building footprint is approximately 350,481 square feet (S.F.). The project will have 240 spaces for parking as well as 66 spaces for trailer parking. The overall on-site impervious surface footprint anticipated for this project is approximately 596,426 S.F. This project also includes minor improvements for the westerly frontage Seaton Avenue and northerly frontage Cajalco Expressway. In order to comply with the Riverside County drainage and water quality management requirements, the project also includes construction of permanent stormwater BMPs.

1.3 Drainage Characteristics

In the existing condition, the site is generally divided into two areas in terms of drainage with a west-east ridge line. The southerly half of the site primarily consists of open/undeveloped land (vegetation appeared to be cleared over time) and runoff from this area generally in a southeasterly direction. The northerly half of the site consists of a few existing residential homes along with areas for automobile storage/parking. Runoff in the northerly half of the site drains generally in a northeasterly direction towards Cajalco Road. Runoff from the site outlets to the two areas of interest (i.e. –northeasterly corner and southerly edge of the site).

The project is situated within the Perris Valley Master Drainage Plan (MDP) where District constructed Perris Valley MDP infrastructures nearby (up to the intersection of Cajalco Road and Harvill Avenue). Runoff from the project is conveyed via surface and contributes to the downstream Perris Valley MDP storm drain systems and eventually discharges into the existing District's Perris Valley Channel, which ultimately discharges to Canyon Lake and then Lake Elsinore. More specifically, the northerly portion of the site drains northeasterly via surface and is captured by the District-maintained Perris Valley MDP Lateral E-8 (Project No. 4-0-00489, Dwg. No. 4-0544) near the intersection of Cajalco Road and Harvill Avenue. The southerly portion of the site drains southeasterly and eventually gets picked up by the District proposed Seaton Basin and Perris Valley MDP Lateral H-12.

In the post-project condition, the drainage characteristics will be maintained as similar to the pre-project condition. Runoff from the site will be captured via proposed catch basins and conveyed via proposed private storm drain pipes towards proposed aboveground bioretention facilities (i.e. – one at the northeasterly corner and the other one at the southeasterly corner of the site) for the purpose of treating the on-site storm water runoff and attenuating the increased runoff back to the existing condition level (i.e. – for 2-year, 5-year, and 10-year storm events), prior to discharging at two points of interest (i.e. –northeasterly corner and southerly edge of the site). Runoff from the northerly drainage basin ("Basin 100") is expected to drain towards the northeasterly corner of the site to a proposed bioretention facility for treatment and detention purposes prior to discharging into a proposed MDP Line H-8 extension, which the project is proposing to construct from the project outlet location to the downstream storm drain connection point that is provided by the storm drain plans (PPT190006), prepared by others. The southerly drainage basin ("Basin 200") is expected to drain towards the southeasterly corner of the site to a proposed bioretention facility for treatment and detention purposes prior to discharging at the southerly edge of the site. More discussion about the increased runoff mitigation is discussed in Section 4.0 of this report.

1.4 FEMA Flood Hazard Zone Information

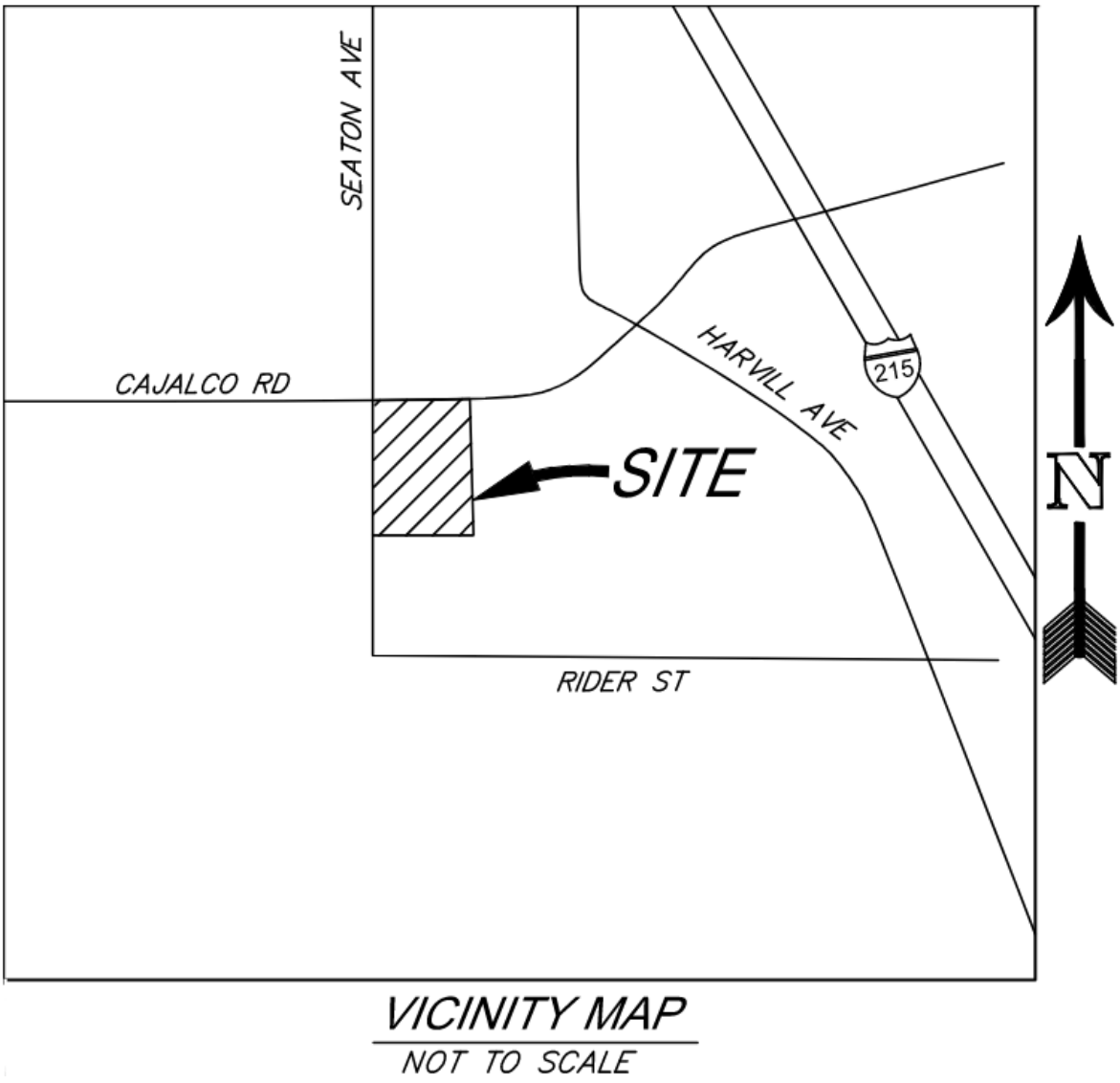
The water courses around the project have been identified by the Federal Emergency Management Agency (FEMA) as Zone X. The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 0605C1410G, effective August 28, 2008 and labeled as Zone X. No FEMA submittals are

anticipated to be required for this project. For reference purpose, a copy of the FIRMette (reduced size) is included at the end of Appendix A.

1.6 Water Quality Management

In support of the preliminary site plan, a preliminary Water Quality Management Plan (WQMP) has been prepared for the project. The report is titled, "Preliminary Water Quality Management Plan for Phelan – Seaton," revised January 21, 2022, prepared by SDH & Associates, Inc. (Job Number 1916). The preliminary WQMP documents how the project addresses the requirements regarding permanent stormwater quality management, in accordance with the stormwater guidance document titled, "2010 Water Quality Management Plan for the Santa Ana Region of Riverside County."

Figure 1: Vicinity Map



2.0 HYDROLOGY

Preliminary hydrologic calculations were prepared in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual) for preliminary on-site storm drain sizing purpose. The Hydrowin Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used to perform the hydrologic analysis in this study.

The AES hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significances are as follows:

Subarea Hydrologic Processes (Codes)

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimated pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow through a subarea
Code 10: Copy main-stream data onto a memory bank
Code 11: Confluence a memory bank with the main-stream memory
Code 12: Clear a memory bank
Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the drainage facility locations and sizes, land uses, flow patterns, drainage basin boundaries, and topographic elevations. Compiled Hydrologic backup is included as Appendix A to this report.

Area

Drainage boundaries were delineated to distinguish areas with similar flow characteristics and hydrologic properties as well as to determine peak flows at confluence points, existing and proposed storm drain facilities, and to facilitate hydraulic analyses. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the hydrologic workmap for the site, included in Appendix B.

Time of Concentration/Intensity

The time of concentration was calculated using the AES to determine the intensity for the 10-year and 100-year storm events. The rainfall intensity was calculated in AES using the 10 and 60-minute intensity values for the project area using NOAA Atlas 14 Point Precipitation Frequency Estimates. A supporting annotated chart has been included in Appendix A.

Runoff Coefficient

The runoff coefficients used for each minor basin were calculated by the AES software based on the user-entered information of the hydrologic soil group and the land use for each basin. The percentage of impervious area (i.e. land use) in each subdrainage area was used to determine the land use entered within AES per Plate D-5.6 of the Hydrology Manual. Supporting information for parameters assigned to AES calculations is included with Appendix A of this report.

Hydrologic soil group data is available for the site through the Natural Resource Conservation Service (NRCS) Web Soil Survey, showing the site consisting primarily of type “C” soils along with small pockets of type “A” and “B” soils. For the purpose of hydrologic calculations for the proposed condition, soil type C has been applied.

Topography

The onsite project specific topography consists of 1-foot contours on the NAVD-88 vertical datum, provided by Arrowhead Mapping Corp.

2.1 Hydrologic Results

The hydrologic results at key points of interest for the project can be found in Table 2.1. The summary shows the hydrologic (modified rational method) results at the proposed on-site catch basin locations (key catch basin locations) and overall on-site peak flow at the project outlet points of interest along the northeasterly and southeasterly corners of the project. The detailed hydrologic calculation results are located in Appendix B of this report.

Table 2.1 – On-site Hydrologic Data Summary at Key Locations (10-year & 100-year)

Key Drainage Node ID[3]	Post-project[1]		
	Total Area (Acres)	Peak Flow Rate, Q_{10} (cfs)[2]	Peak Flow Rate, Q_{100} (cfs)[2]
110 (On-site Catch Basin - Surface)	0.3	0.7	1.2
115 (On-site Catch Basin - Surface)	0.5	0.7	1.2
120 (On-site Catch Basin - Surface)	3.0	4.2	7.4
132 (On-site Catch Basin - Surface)	0.4	0.8	1.4
134 (On-site Catch Basin - Surface)	0.1	0.2	0.4
150 (On-site – Discharge into Proposed BMP)	8.4	12.4	21.6
160 (On-site – Basin 100 Outlet)	**8.9**	**13.1**	**22.7**
205 (On-site Catch Basin - Surface)	1.2	2.1	3.6
220 (On-site Catch Basin - Surface)	2.4	3.3	6.0
240 (On-site Catch Basin - Surface)	2.9	4.4	7.8
245 (On-site – Discharge into Proposed BMP)	2.9	4.4	7.8
250 (On-site – Discharge into Proposed BMP)	3.6	5.4	9.6
255 (On-site – Basin 200 Outlet)	**6.8**	**8.4**	**15.2**

Note:

1: Refer to Appendix A for supporting information.

2: "cfs"= cubic feet per second.

3: Refer to Appendix B for Drainage Study Map

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 10-year and 100-year, 1-hour post-project peak flow rates were calculated. For the on-site private storm drain systems, the 10-year peak flow rates based on the Modified Rational Method (AES Rational Method) outputs are used to determine preliminary sizes.

3.2 Inlet Sizing

Inlet design calculation specific to the proposed surface catch basin and BMP overflow catch basin will be conducted during final engineering and calculation output will be incorporated in Appendix C. In the post-project condition, the on-site proposed private storm drain catch basins (inlets) will be designed to intercept, at a minimum, 10-year, 1-hour peak flow rates.

For the proposed half width frontage street improvement within the public right-of-way, a hydraulic calculation (normal depth calculation) is anticipated to be provided during final engineering to check for the anticipated normal depth within the gutter and its spread width.

3.3 Storm Drain Sizing

Preliminary storm drain sizing calculations were conducted in order to size the proposed on-site private storm drain pipes. The calculations were prepared using the 10-year, 1-hour peak flow rate output from the AES Rational Method and the Manning's equation along with a 30% sizing bump-up (factor) to account for potential hydraulic losses. Typically, this calculation approach is adequate for on-site private storm drain sizing. If necessary, additional supporting hydraulic calculation may be provided at the time of final drainage study to validate the required storm drain sizes. A summary of relevant on-site storm drain sizing calculations is provided in Appendix D.

Separately, the project is proposing to construct a Master Drainage Plan (MDP) "Line E-8" extension along Cajalco Road from the project's northeasterly outlet location (in Basin 100) to the downstream storm drain pipe constructed as part of the PPT190006 Storm Drain Improvement Plan (prepared by others), for approximately 1,278 feet (+/-). A preliminary take-off calculation was prepared using the WSPG to estimate the required pipe size for the "Line E-8" extension and check

that the HGL is at least 1' below the Cajalco Road finished grades. Based on the preliminary take-off calculation, it appears that a 24-inch reinforced concrete pipe (RCP) would be sufficient for the extension from the project site down to the storm drain connection point (per the PPT19006 Storm Drain Plan). A copy of the preliminary take-off calculation is provided in Appendix D of this report for reference purpose. During the final engineering stage, a detailed storm drain plan/profile will be provided for the pipe extension along Cajalco Road and the hydraulic calculation (WSPG) will be updated accordingly.

4.0 DETENTION ANALYSIS

The project is expected to increase the peak flow rate as a result of the proposed improvements. In order to mitigate for anticipated increased runoff due to the proposed development, the project proposes two (2) biofiltration facilities (basins) near the northeasterly and southeasterly corners of the project to attenuate/mitigate the increased peak flow rates back to the existing condition level or less, prior to discharging at the points of interest. In order to address the County of Riverside's increased runoff criteria, it is anticipated that the proposed bioretention facilities (basins) will provide the peak flow attenuation for the 2-year, 5-year, and 10-year storm events. At this preliminary stage, based on the direction provided in the comment letter received from the County of Riverside (i.e. – per "015-Flood Increased Runoff Criteria"), a preliminary detention calculation was prepared using Hydrologic Modeling System (HEC-HMS), Version 4.8, in order to determine the runoff hydrograph volume difference between the pre-project condition and post-project condition for the 24-hour duration event for the 10-year storm frequency. At a later stage (i.e. – during final engineering), detailed calculations using Hydrologic Modeling System (HEC-HMS) will be prepared to analyze the multiple storm events for peak flow mitigation, including 2-year, 5-year, and 10-year for 1-hour, 3-hour, 6-hour, and 24-hour durations, in accordance with Riverside County Flood Control & Water Conservation District's (RCFC&WCD's) increased runoff criteria. A summary of the preliminary detention calculation results (volume summary) is provided below in Table 4.1.

Table 4.1 – 10-yr, 24-hour Runoff Hydrograph Volume Summary

Storm Event	Drainage Basin ID	Runoff Hydrograph Volume Summary (acre-feet)			
		Pre-project	Post-project	Delta	BMP Capacity[1]
10-year, 24-hour	100	1.98	2.60	0.63	0.63
	200	1.00	2.12	1.12	1.12

Note:

1. "Delta" = post-project runoff volume – pre-project runoff volume.
2. The basin capacities are measured using the volumes only within the aboveground portions of the proposed bioretention facilities and supplemental underground storage. As directed by RCFC, volumes within the subsurface layers of the bioretention facilities were not considered. The Basin 100 basin (BMP) capacity is to be achieved at the relative elevation of 5.00' while the Basin 200 basin (BMP) capacity is to be provided at the relative elevation of 5.50'.

Based on the global summary results from the HEC-HMS, the hydrograph volume difference between the pre-project condition and post-project condition for Basin 100 is expected to be approximately 0.63 acre-feet and for Basin 200 is expected to be approximately 1.12 acre-feet. The proposed bioretention facilities (basins) for Basin 100 and Basin 200 are expected to provide approximately 0.63 acre-feet (up to the relative elevation of 5.00 feet) for Basin 100 and 1.12 acre-feet (up to the relative elevation of 5.50 feet). Therefore, it is expected that the proposed basins will have adequate volume capacity to meet the Flood Increased Runoff Criteria. Supporting documentation from the HEC-HMS (including the pre-project and post-project workmaps, project-specific precipitation data from NOAA Atlas 14, typical BMP/basin sections, rating curve (stage-storage-discharge) summary tables, analysis results summary, and pre-processor data, are included in Appendix E of this report. As a note, based on direction from RCFC, the available volume in the subsurface layers of the proposed bioretention facilities were not considered in the increased runoff routing analysis. Only the volumes within the aboveground portion of the bioretention facilities and supplemental underground facilities are considered in the routing analysis.

As a separate note, the project is situated in the Riverside County HCOC exempt area approved on April 20, 2017, and it is anticipated to be exempt from the hydrologic condition of concern (HCOC) requirements.

5.0 CONCLUSION

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Phelan-Seaton project. Hydrologic calculations were computed in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual). The Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used for the rational method modeling in this study. The peak discharge rates for the 10-year and 100-year, 1-hour storm events have been determined for the project. The relevant 10-year peak flow rates were used to determine the preliminary onsite private storm drain sizes. The project also plans to construct a MDP "Line E-8" extension from the site's outlet point at the northeasterly corner of the site to the downstream storm drain system constructed as part of the PPT190006 Storm Drain Plan (prepared by others). The proposed on-site private catch basin sizing will be provided at the time of the final drainage study (final engineering). A preliminary detention calculation using HEC-HMS has been prepared for the 10-year, 24-hour storm event to show that adequate storage volume is provided in the proposed BMP to be in conformance with the RCFC&WCD's increased runoff detention criteria. More detailed flow attenuation calculations for various storm events/durations will be provided at the time of final drainage study for full compliance with the increased runoff mitigation criteria. As indicated above, the outflow from Basin 100 will connect into the proposed Lateral Line E-8 extension. For Basin 200, the storm drain outlet from the proposed basin will be protected with an ample amount of energy dissipaters (riprap) in order to slow down and spread the flows as similar to the pre-project condition, prior to crossing the southerly property line. In summary, with incorporation of the mitigation mentioned above, no adverse impacts are anticipated to the downstream drainage facilities.

Appendix A

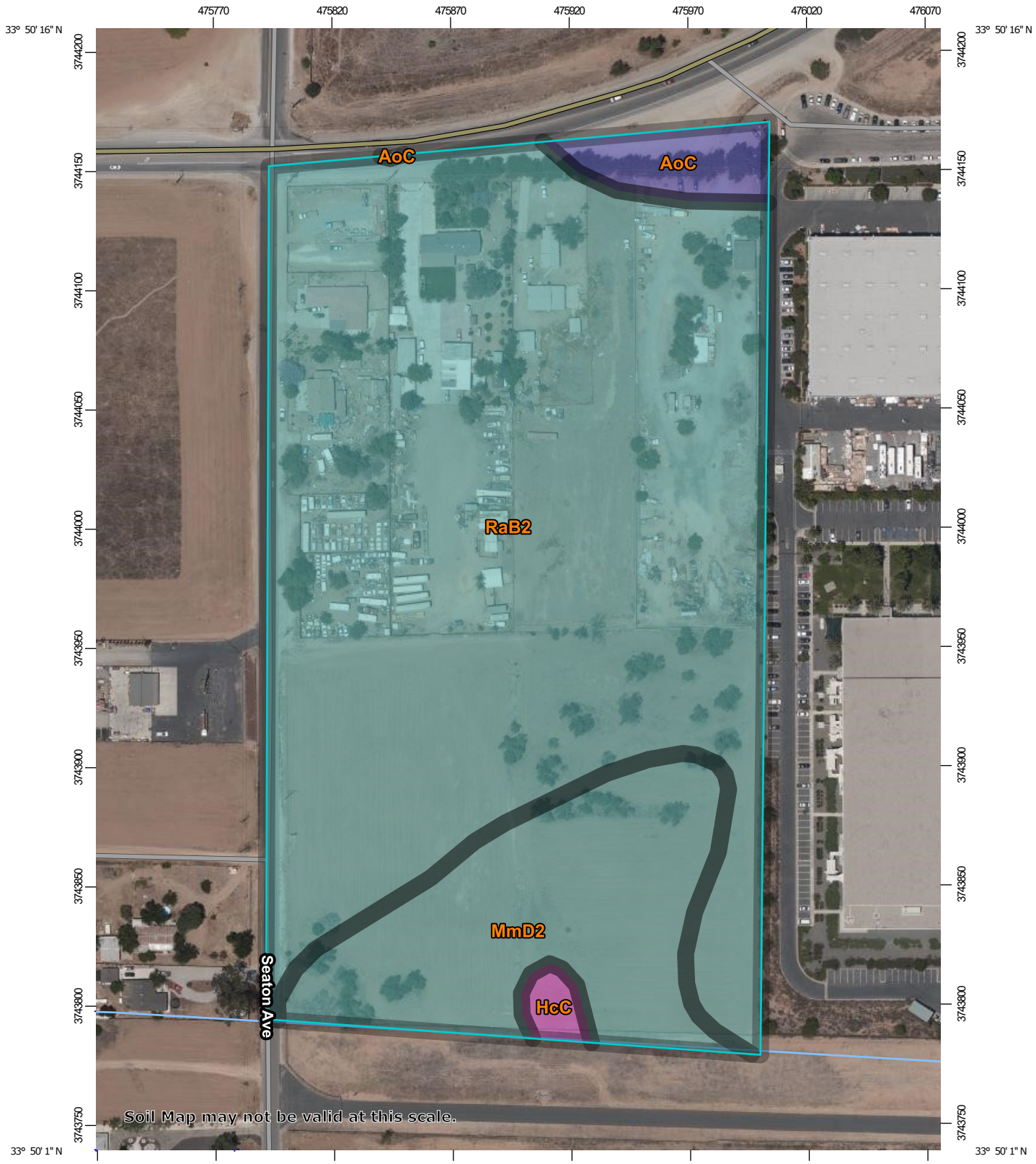
Hydrologic Backup Information

Includes:

1. Web Soil Survey Hydrologic Soil Group
2. NOAA Atlas 14 Annotated Rainfall Intensity Chart
3. FEMA FIRMette

SUPPORTING MATERIALS - HYDROLOGIC SOILS GROUP
MAJORITY OF THE SITE CONSISTS OF HYDROLOGIC SOIL GROUP "C"; THEREFORE, FOR THE PURPOSE OF HYDROLOGIC CALCULATIONS, SOIL TYPE "C" WAS UTILIZED.

Hydrologic Soil Group—Western Riverside Area, California



Map Scale: 1:2,300 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 13, May 27, 2020

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

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AoC	Arlington fine sandy loam, deep, 2 to 8 percent slopes	B	0.6	2.9%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	A	0.2	0.9%
MmD2	Monserate sandy loam, 8 to 15 percent slopes, eroded	C	3.4	17.6%
RaB2	Ramona sandy loam, 2 to 5 percent slopes, eroded	C	15.3	78.5%
Totals for Area of Interest			**19.5**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SUPPORTING MATERIALS - NOAA ATALAS 14 - INTENSITY
10-YEAR AND 100-YEAR (10-MIN. & 60-MIN.)

NOAA Atlas 14, Volume 6, Version 2
Location name: Perris, California, USA*
Latitude: 33.8362°, Longitude: -117.2605°
Elevation: 1556.53 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.04** (0.876-1.27)	**1.46** (1.22-1.76)	**2.03** (1.69-2.46)	**2.52** (2.08-3.08)	**3.22** (2.57-4.08)	**3.78** (2.95-4.90)	**4.38** (3.34-5.83)	**5.04** (3.72-6.90)	**5.98** (4.22-8.54)	**6.76** (4.61-10.0)
10-min	**0.750** (0.630-0.906)	**1.05** (0.876-1.27)	**1.46** (1.21-1.76)	**1.81** (1.49-2.21)	**2.30** (1.84-2.92)	**2.71** (2.11-3.51)	**3.14** (2.39-4.18)	**3.61** (2.66-4.94)	**4.28** (3.03-6.12)	**4.84** (3.30-7.17)
15-min	**0.604** (0.508-0.732)	**0.844** (0.704-1.02)	**1.17** (0.976-1.42)	**1.46** (1.20-1.78)	**1.86** (1.48-2.36)	**2.18** (1.70-2.83)	**2.54** (1.93-3.37)	**2.91** (2.15-3.98)	**3.46** (2.44-4.94)	**3.90** (2.66-5.78)
30-min	**0.484** (0.404-0.584)	**0.674** (0.562-0.816)	**0.936** (0.780-1.14)	**1.16** (0.958-1.42)	**1.48** (1.18-1.88)	**1.74** (1.36-2.26)	**2.02** (1.54-2.69)	**2.32** (1.71-3.18)	**2.76** (1.95-3.94)	**3.11** (2.12-4.61)
60-min	**0.328** (0.274-0.396)	**0.457** (0.382-0.553)	**0.635** (0.529-0.771)	**0.787** (0.650-0.963)	**1.00** (0.801-1.27)	**1.18** (0.922-1.53)	**1.37** (1.04-1.82)	**1.58** (1.16-2.16)	**1.87** (1.32-2.67)	**2.11** (1.44-3.13)
2-hr	**0.246** (0.206-0.298)	**0.329** (0.274-0.398)	**0.440** (0.366-0.534)	**0.533** (0.440-0.652)	**0.664** (0.528-0.840)	**0.766** (0.598-0.993)	**0.874** (0.664-1.16)	**0.988** (0.730-1.35)	**1.15** (0.811-1.64)	**1.27** (0.870-1.89)
3-hr	**0.202** (0.169-0.245)	**0.266** (0.222-0.322)	**0.352** (0.293-0.427)	**0.422** (0.349-0.517)	**0.520** (0.415-0.659)	**0.597** (0.466-0.774)	**0.677** (0.514-0.899)	**0.760** (0.561-1.04)	**0.876** (0.619-1.25)	**0.967** (0.660-1.43)
6-hr	**0.143** (0.120-0.173)	**0.187** (0.156-0.226)	**0.243** (0.203-0.295)	**0.290** (0.239-0.355)	**0.354** (0.282-0.448)	**0.403** (0.315-0.523)	**0.454** (0.345-0.604)	**0.507** (0.374-0.693)	**0.579** (0.409-0.827)	**0.635** (0.433-0.941)
12-hr	**0.094** (0.079-0.114)	**0.123** (0.103-0.149)	**0.162** (0.135-0.196)	**0.193** (0.159-0.236)	**0.235** (0.187-0.298)	**0.268** (0.209-0.347)	**0.301** (0.229-0.400)	**0.336** (0.248-0.459)	**0.382** (0.270-0.546)	**0.419** (0.286-0.620)
24-hr	**0.062** (0.055-0.071)	**0.082** (0.073-0.095)	**0.109** (0.096-0.127)	**0.131** (0.115-0.153)	**0.161** (0.137-0.194)	**0.184** (0.153-0.227)	**0.208** (0.168-0.262)	**0.232** (0.183-0.300)	**0.265** (0.201-0.357)	**0.291** (0.213-0.405)
2-day	**0.036** (0.032-0.041)	**0.049** (0.043-0.056)	**0.065** (0.058-0.076)	**0.079** (0.069-0.093)	**0.099** (0.083-0.119)	**0.113** (0.094-0.140)	**0.129** (0.104-0.162)	**0.145** (0.114-0.187)	**0.166** (0.126-0.224)	**0.184** (0.134-0.256)
3-day	**0.025** (0.022-0.029)	**0.035** (0.031-0.040)	**0.047** (0.042-0.055)	**0.058** (0.051-0.068)	**0.072** (0.061-0.087)	**0.084** (0.070-0.103)	**0.096** (0.077-0.120)	**0.108** (0.085-0.140)	**0.125** (0.095-0.169)	**0.139** (0.102-0.193)
4-day	**0.020** (0.018-0.024)	**0.028** (0.025-0.033)	**0.039** (0.034-0.045)	**0.047** (0.042-0.055)	**0.060** (0.051-0.072)	**0.069** (0.057-0.085)	**0.079** (0.064-0.100)	**0.090** (0.071-0.116)	**0.104** (0.079-0.141)	**0.116** (0.085-0.162)
7-day	**0.013** (0.011-0.015)	**0.018** (0.016-0.021)	**0.025** (0.022-0.029)	**0.031** (0.027-0.036)	**0.039** (0.033-0.047)	**0.045** (0.037-0.056)	**0.052** (0.042-0.065)	**0.059** (0.046-0.076)	**0.069** (0.052-0.093)	**0.077** (0.056-0.107)
10-day	**0.009** (0.008-0.011)	**0.013** (0.012-0.015)	**0.018** (0.016-0.021)	**0.023** (0.020-0.026)	**0.029** (0.024-0.035)	**0.034** (0.028-0.041)	**0.039** (0.031-0.049)	**0.044** (0.035-0.057)	**0.052** (0.039-0.070)	**0.058** (0.042-0.081)
20-day	**0.005** (0.005-0.006)	**0.008** (0.007-0.009)	**0.011** (0.010-0.013)	**0.014** (0.012-0.016)	**0.018** (0.015-0.021)	**0.021** (0.017-0.026)	**0.024** (0.020-0.030)	**0.028** (0.022-0.036)	**0.033** (0.025-0.044)	**0.037** (0.027-0.052)
30-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.008** (0.007-0.010)	**0.011** (0.009-0.012)	**0.014** (0.012-0.016)	**0.016** (0.013-0.020)	**0.019** (0.015-0.024)	**0.022** (0.017-0.028)	**0.026** (0.020-0.035)	**0.030** (0.022-0.042)
45-day	**0.003** (0.003-0.004)	**0.005** (0.004-0.005)	**0.006** (0.006-0.007)	**0.008** (0.007-0.009)	**0.011** (0.009-0.013)	**0.013** (0.011-0.016)	**0.015** (0.012-0.019)	**0.017** (0.014-0.023)	**0.021** (0.016-0.029)	**0.024** (0.018-0.034)
60-day	**0.003** (0.002-0.003)	**0.004** (0.003-0.004)	**0.005** (0.005-0.006)	**0.007** (0.006-0.008)	**0.009** (0.008-0.011)	**0.011** (0.009-0.013)	**0.013** (0.010-0.016)	**0.015** (0.012-0.019)	**0.018** (0.014-0.025)	**0.021** (0.015-0.029)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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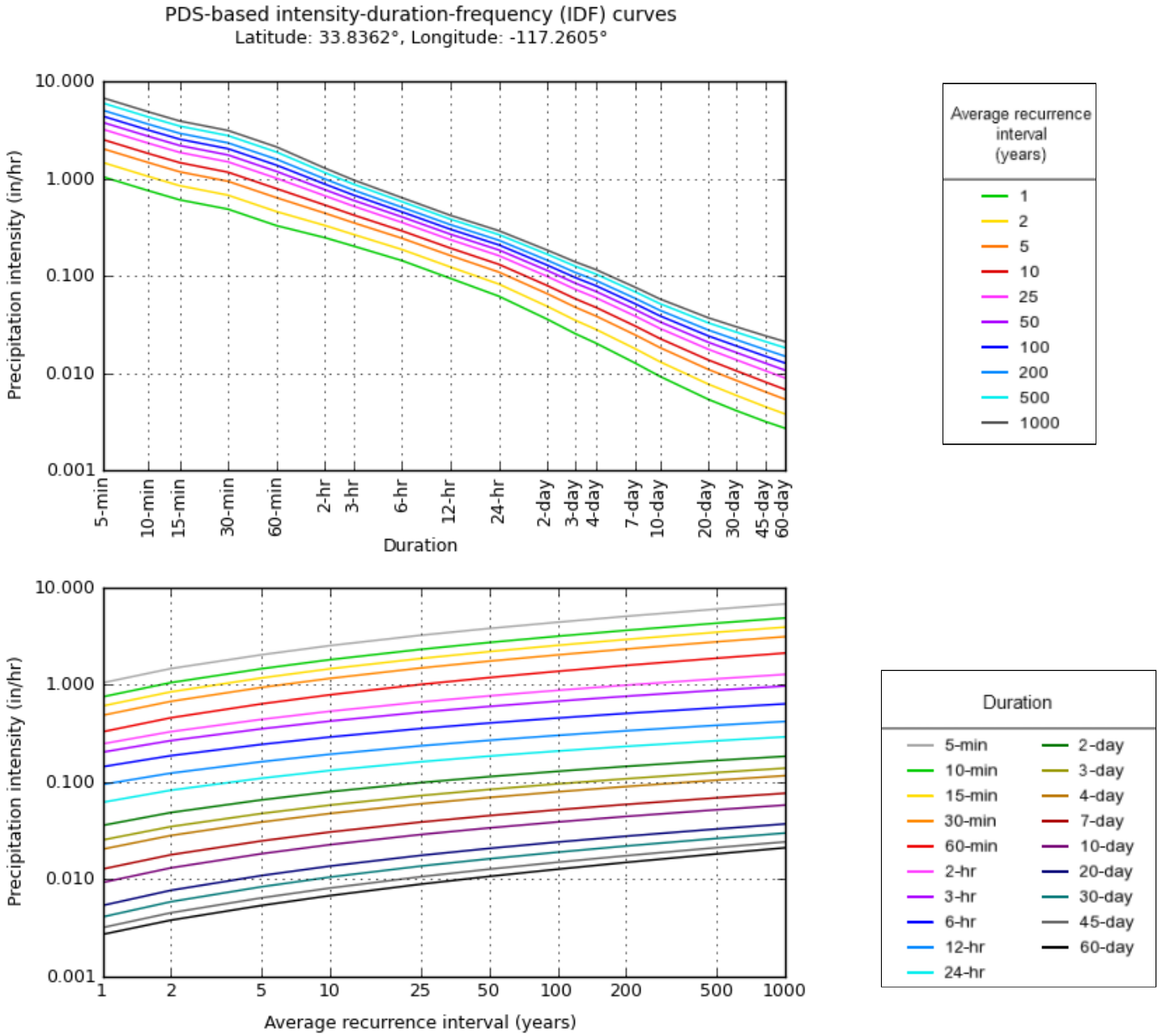
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Jun 23 00:04:39 2021

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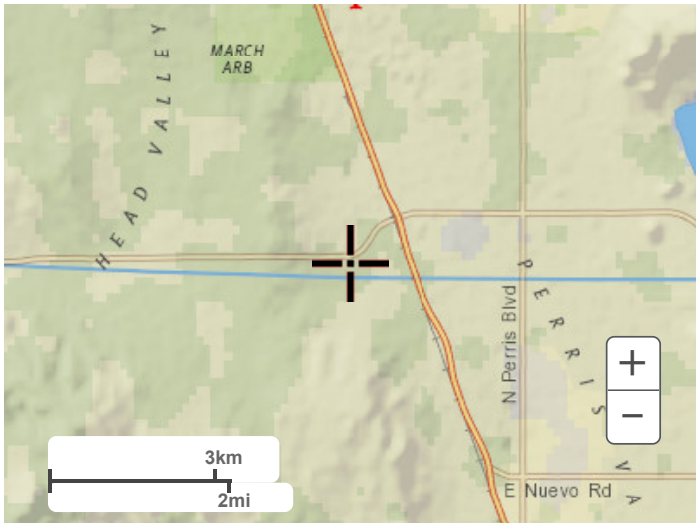
Maps & aerials

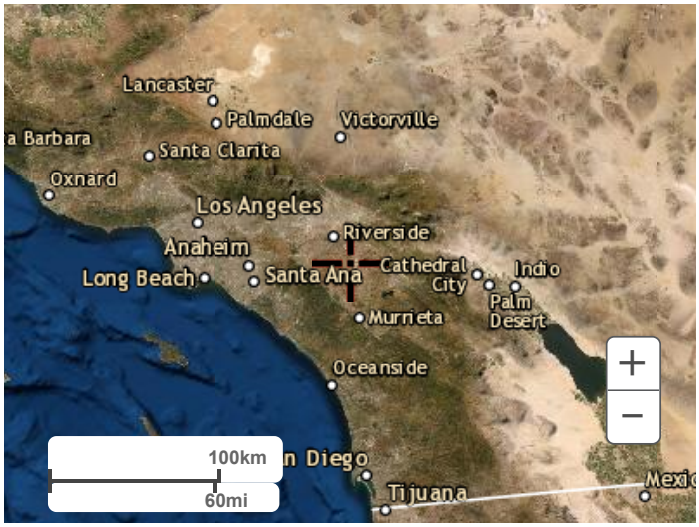
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

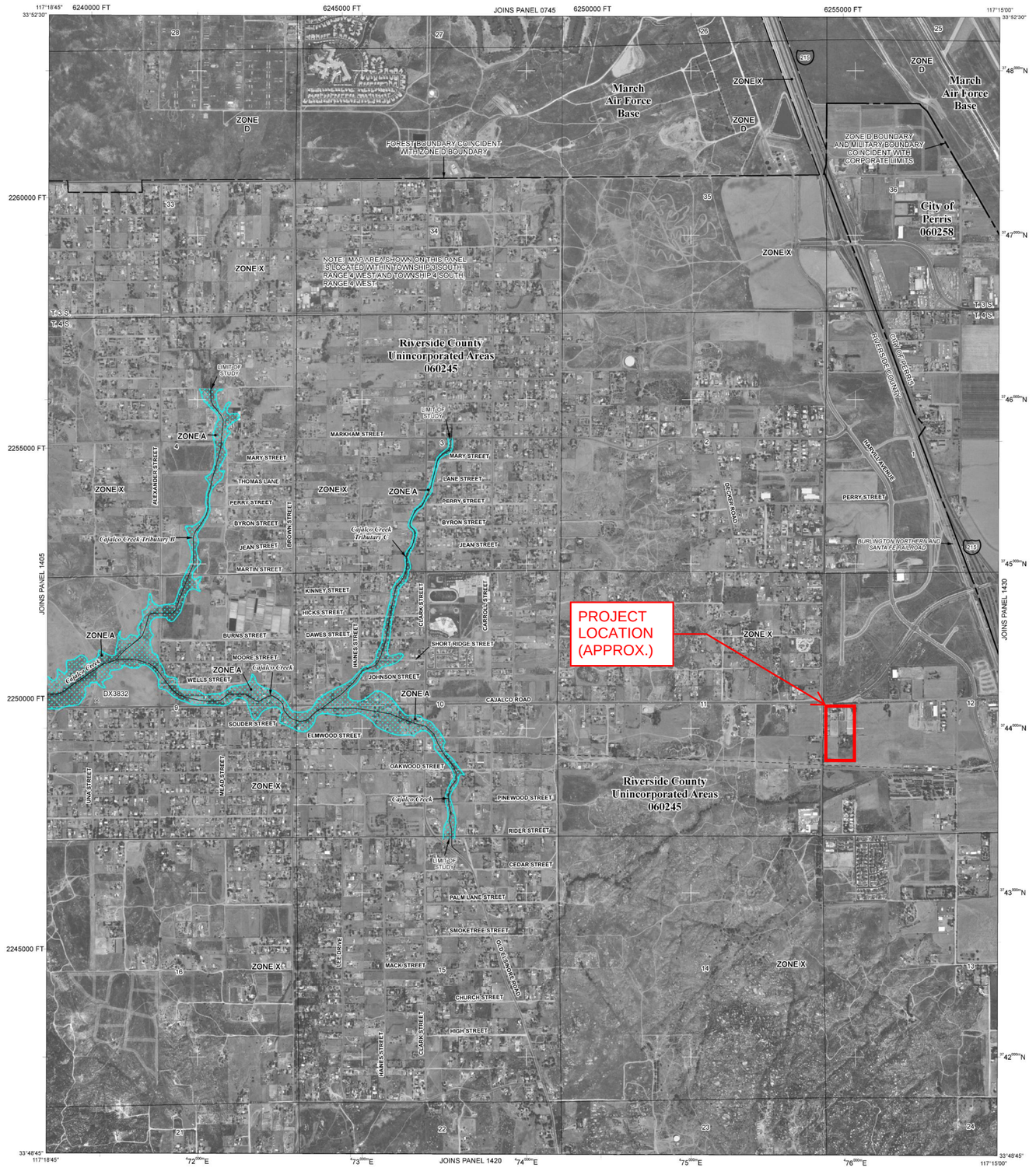
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

SUPPORTING MATERIALS - FIRMette

THE PROJECT IS SITUATED OUTSIDE OF FEMA 100-YEAR FLOODPLAIN; THEREFORE, PROCESSING THROUGH FEMA SHOULD NOT BE APPLICABLE.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3776000 N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1410G

FIRM
FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1410 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PERRIS, CITY OF	060258	1410	G
RIVERSIDE COUNTY	060245	1410	G

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

MAP NUMBER
06065C1410G

EFFECTIVE DATE
AUGUST 28, 2008

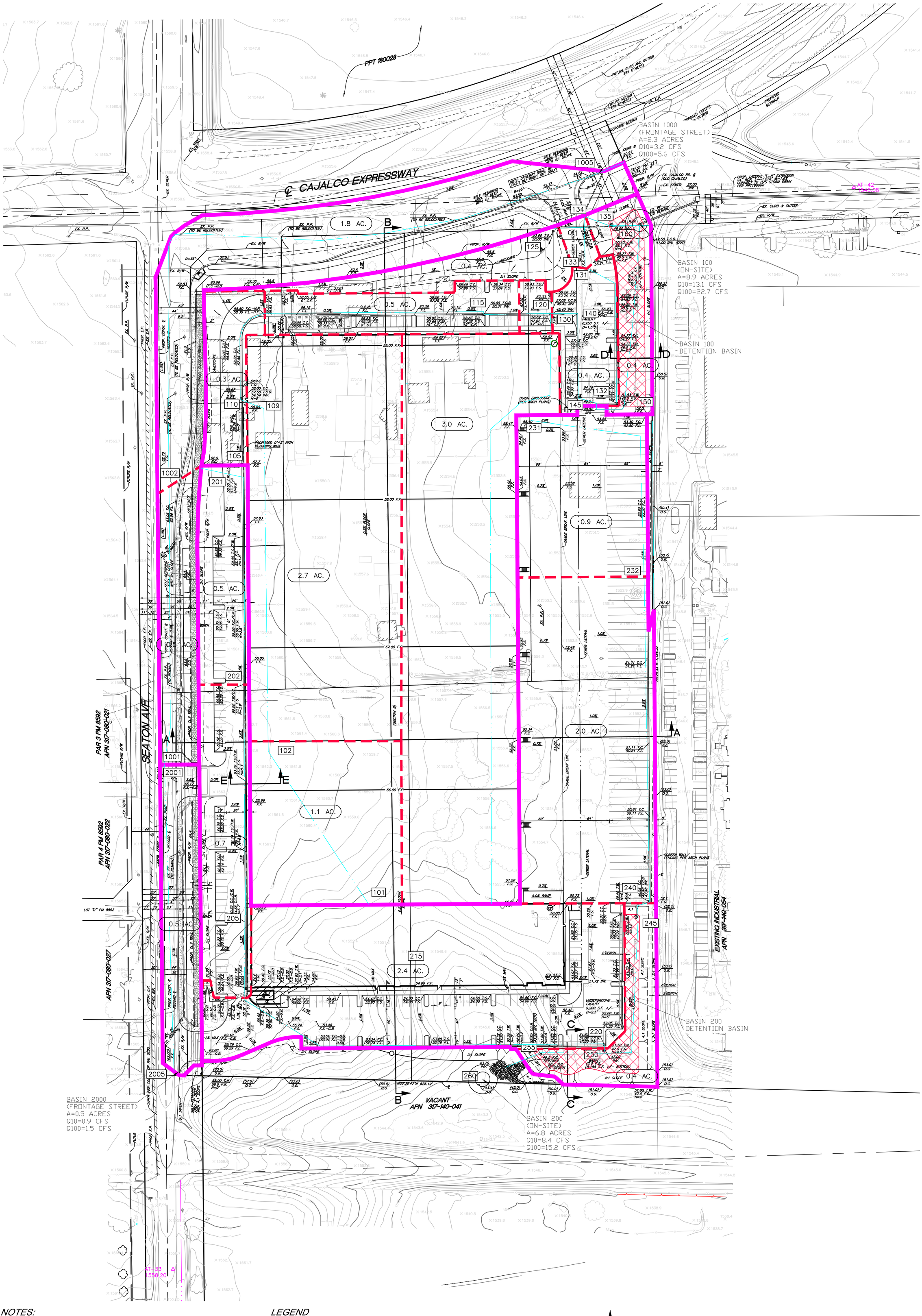
Federal Emergency Management Agency

Appendix B

Modified Rational Method Results

Includes:

1. Post-project Drainage Study Map
2. Post-project AES Rational Method Output



NOTES:

1. THIS DRAINAGE STUDY EXHIBIT IS PREPARED IN SUPPORT OF THE ON-SITE PRELIMINARY HYDROLOGIC CALCULATIONS AND STORM DRAIN SIZING. SEPARATE EXHIBITS ARE PREPARED FOR THE PURPOSE OF COMPARING PRE-PROJECT AND POST-PROJECT FLOWS TO ADDRESS POTENTIAL HYDROLOGIC CONDITIONS OF CONCERN (INCREASED RUNOFF CRITERIA).
2. BASED ON THE WEB SOIL SURVEY (ONLINE RESOURCE), THE PROJECT CONSISTS OF HYDROLOGIC SOIL GROUPS A, B, AND C WITH THE MAJORITY BEING THE SOIL GROUP C. FOR THE PURPOSE OF HYDROLOGIC CALCULATIONS, SOIL GROUP C WAS UTILIZED (TO BE SLIGHTLY MORE CONSERVATIVE).
3. THE PROJECT IS SITUATED WITHIN THE FEMA ZONE X; THEREFORE, PROCESSING THROUGH FEMA IS NOT EXPECTED TO BE REQUIRED FOR THIS PROJECT.
4. THE PROJECT PLANS TO CONSTRUCT A MDP "LINE E-8" EXTENSION ALONG CAJALCO ROAD TO CONNECT INTO AN EXISTING 24-INCH RCP CONSTRUCTED AS PART OF THE PPT190006 STORM DRAIN PLAN (BY OTHERS). THE ON-SITE BASIN 100 RUNOFF WILL CONNECT INTO THE PROPOSED "LINE E-8" EXTENSION.

LEGEND

- TRACT BOUNDARY
- MAJOR DRAINAGE BOUNDARY
- SUB BASIN BOUNDARY
- FLOW PATH
- DRAINAGE ACREAGE — X.X AC.
- BASIN NODE ID — XXX

DRAINAGE STUDY MAP FOR PHELAN - SEATON (POST-PROJECT) PPT210133

JN 1916 REVISED DATE: 1/21/2022

NOT FOR CONSTRUCTION - EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY

S:\SDH DRAWINGS\PHELAN-SEATON\WR\DRN Exhibit Post.dwg 2022-01-21 - 1:49PM - SDH

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**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1717

                         Analysis prepared by:

                         SDH & ASSOCIATES, INC.
                          27363 VIA INDUSTRIA
                           TEMECULA, CA 92590
                             (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* PHELAN-SEATON (JN 1916)                                                *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 100                                                              *
 **************************************************************************

  FILE NAME: PS1HP10.RAT
  TIME/DATE OF STUDY: 16:39 01/20/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.787
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.140
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.370
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4648244
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4629036
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.795
  SLOPE OF INTENSITY DURATION CURVE = 0.4648
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  UPSTREAM ELEVATION(FEET) =     81.00
  DOWNSTREAM ELEVATION(FEET) =     80.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  TC = 0.303*[(  260.00**3)/(     1.00)]**.2 =    8.523
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.969
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8790
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      1.10   TOTAL RUNOFF(CFS) =      1.90

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    109.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    79.00  DOWNSTREAM(FEET) =    78.00
  FLOW LENGTH(FEET) =   470.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.45
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.90
  PIPE TRAVEL TIME(MIN.) =   3.20    Tc(MIN.) =   11.72
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    109.00 =     730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.698
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8765
  SOIL CLASSIFICATION IS "C"
```

```
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    4.02
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =       5.92
  TC(MIN.) =   11.72

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.00  DOWNSTREAM(FEET) =    54.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.71
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.92
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   1.70
  TOTAL STREAM AREA(ACRES) =     3.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.92

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    62.00
  UPSTREAM ELEVATION(FEET) =     62.30
  DOWNSTREAM ELEVATION(FEET) =     57.50
  ELEVATION DIFFERENCE(FEET) =      4.80
  TC = 0.303*[(   62.00**3)/(     4.80)]**.2 =    2.635
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.523
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8827
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.67
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.52
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.67

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.92    11.74        1.697          3.80
      2        0.67     5.00        2.523          0.30

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        3.19     5.00       2.523
      2        6.37    11.74       1.697

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.37   Tc(MIN.) =   11.74
  TOTAL AREA(ACRES) =        4.1
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    54.50  DOWNSTREAM(FEET) =    50.30
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.26
```

```
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.37
  PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =   12.90
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.624
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8757
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =        4.6   TOTAL RUNOFF(CFS) =       7.08
  TC(MIN.) =   12.90

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.30  DOWNSTREAM(FEET) =    49.40
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.55
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.08
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =    1291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.611
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8756
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =    4.23
  TOTAL AREA(ACRES) =        7.6   TOTAL RUNOFF(CFS) =      11.31
  TC(MIN.) =   13.13

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    49.40  DOWNSTREAM(FEET) =    49.30
  FLOW LENGTH(FEET) =     4.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.32
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.31
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.14
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =    1295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.40  DOWNSTREAM(FEET) =    49.30
  FLOW LENGTH(FEET) =     4.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.30
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.31
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.14
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.610
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8756
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.56
  TOTAL AREA(ACRES) =        8.0   TOTAL RUNOFF(CFS) =      11.88
  TC(MIN.) =   13.14

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.30  DOWNSTREAM(FEET) =    49.20
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.88
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.26
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    140.00 =    1332.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.20  DOWNSTREAM(FEET) =    48.50
  FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.66
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.88
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   13.68
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    145.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.68
  RAINFALL INTENSITY(INCH/HR) =   1.58
  TOTAL STREAM AREA(ACRES) =     8.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.88

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   204.00
  UPSTREAM ELEVATION(FEET) =     56.50
  DOWNSTREAM ELEVATION(FEET) =     53.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  TC = 0.303*[(  204.00**3)/(     3.20)]**.2 =    5.839
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.348
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8817
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.30  DOWNSTREAM(FEET) =    48.50
  FLOW LENGTH(FEET) =    32.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.83
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.90
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    145.00 =     236.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.90
  RAINFALL INTENSITY(INCH/HR) =   2.34
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.83

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.88    13.68        1.580          8.00
      2        0.83     5.90        2.335          0.40

 **********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.96     5.90       2.335
      2       12.44    13.68       1.580

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.44   Tc(MIN.) =   13.68
  TOTAL AREA(ACRES) =        8.4
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    145.00 =    1474.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    48.50  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.73
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.44
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.84
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =    1541.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     48.00  DOWNSTREAM(FEET) =     47.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   248.00   CHANNEL SLOPE =  0.0004
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.353
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8724
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.78
  AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   5.28
  Tc(MIN.) =   19.12
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.47
  TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =      12.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    160.00 =    1789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.12
  RAINFALL INTENSITY(INCH/HR) =   1.35
  TOTAL STREAM AREA(ACRES) =     8.80
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.91

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    62.00
  UPSTREAM ELEVATION(FEET) =     56.50
  DOWNSTREAM ELEVATION(FEET) =     53.20
  ELEVATION DIFFERENCE(FEET) =      3.30
  TC = 0.303*[(   62.00**3)/(     3.30)]**.2 =    2.840
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.523
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8827
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.20  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.61
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.22
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.10
  LONGEST FLOWPATH FROM NODE    133.00 TO NODE    135.00 =      96.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     48.00  DOWNSTREAM(FEET) =     47.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    40.00   CHANNEL SLOPE =  0.0025
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.22
  FLOW VELOCITY(FEET/SEC.) =   0.27   FLOW DEPTH(FEET) =   0.04
  TRAVEL TIME(MIN.) =   2.47   Tc(MIN.) =    7.57
```

```
  LONGEST FLOWPATH FROM NODE    133.00 TO NODE    160.00 =     136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.57
  RAINFALL INTENSITY(INCH/HR) =   2.08
  TOTAL STREAM AREA(ACRES) =     0.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.22

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       12.91    19.12        1.353          8.80
      2        0.22     7.57        2.081          0.10

 **********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.33     7.57       2.081
      2       13.06    19.12       1.353

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.06   Tc(MIN.) =   19.12
  TOTAL AREA(ACRES) =        8.9
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    160.00 =    1789.00 FEET.

+----------------------------------------------------------------------------+
| NOTES:                                                                     |
| NODES 1001 THRU 1005: FOR OFF-SITE HALF STREET IMPROVEMENT                 |
| SUPPORTING OFF-SITE HALF STREET HYDROLOGIC CALCULATIONS                    |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   415.00
  UPSTREAM ELEVATION(FEET) =     65.10
  DOWNSTREAM ELEVATION(FEET) =     62.00
  ELEVATION DIFFERENCE(FEET) =      3.10
  TC = 0.303*[(  415.00**3)/(     3.10)]**.2 =    8.998
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.920
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8786
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1005.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   51.50
  STREET LENGTH(FEET) =   870.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.20
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   6.60   Tc(MIN.) =   15.60
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.487
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8742
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    2.34
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       3.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.95
```

```
  FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1005.00 =    1285.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     15.60
  PEAK FLOW RATE(CFS)   =       3.18
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1717

                        Analysis prepared by:

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                         27363 VIA INDUSTRIA
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                            (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* PHELAN-SEATON (JN 1916)                                                *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 200                                                              *
 **************************************************************************

  FILE NAME: PS2HP10.RAT
  TIME/DATE OF STUDY: 11:31 09/22/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.787
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.140
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.370
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4648244
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4629036
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.795
  SLOPE OF INTENSITY DURATION CURVE = 0.4648
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   340.00
  UPSTREAM ELEVATION(FEET) =     62.50
  DOWNSTREAM ELEVATION(FEET) =     56.20
  ELEVATION DIFFERENCE(FEET) =      6.30
  TC = 0.303*[(  340.00**3)/(     6.30)]**.2 =    6.928
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.168
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8805
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.95
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    205.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   56.20  DOWNSTREAM ELEVATION(FEET) =   54.55
  STREET LENGTH(FEET) =   317.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   3.57   Tc(MIN.) =   10.50
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.787
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8774
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.10
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       2.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.83
  FLOW VELOCITY(FEET/SEC.) =  1.59   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    205.00 =     657.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.45  DOWNSTREAM(FEET) =    47.20
  FLOW LENGTH(FEET) =   625.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.72
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   2.80    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    220.00 =    1282.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.601
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       5.42
  TC(MIN.) =   13.30

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.20  DOWNSTREAM(FEET) =    46.95
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.01
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       5.42
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.31
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    250.00 =    1287.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.31
  RAINFALL INTENSITY(INCH/HR) =   1.60
  TOTAL STREAM AREA(ACRES) =     3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.42

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   345.00
  UPSTREAM ELEVATION(FEET) =     54.40
  DOWNSTREAM ELEVATION(FEET) =     52.00
  ELEVATION DIFFERENCE(FEET) =      2.40
  TC = 0.303*[(  345.00**3)/(     2.40)]**.2 =    8.477
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.974
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8790
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.56
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      1.56

****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    240.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   52.00  DOWNSTREAM ELEVATION(FEET) =   49.46
  STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.00
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   4.15   Tc(MIN.) =   12.63
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.640
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8759
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    2.87
  TOTAL AREA(ACRES) =        2.9        PEAK FLOW RATE(CFS) =       4.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.58
  FLOW VELOCITY(FEET/SEC.) =  1.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE    231.00 TO NODE    240.00 =     792.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.07  DOWNSTREAM(FEET) =    47.00
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.76
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.44
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   12.72
  LONGEST FLOWPATH FROM NODE    231.00 TO NODE    245.00 =     814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     47.00  DOWNSTREAM(FEET) =     46.95
  CHANNEL LENGTH THRU SUBAREA(FEET) =   222.00   CHANNEL SLOPE =  0.0002
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.295
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8715
  SOIL CLASSIFICATION IS "C"
```

```
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.60
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.45
 AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   8.28
 Tc(MIN.) =   21.00
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.34
 TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =       4.77

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   0.45
 LONGEST FLOWPATH FROM NODE    231.00 TO NODE    250.00 =    1036.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.00
 RAINFALL INTENSITY(INCH/HR) =   1.29
 TOTAL STREAM AREA(ACRES) =     3.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.77

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.42    13.31        1.601          3.60
     2        4.77    21.00        1.295          3.20

 ********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        8.44    13.31       1.601
     2        9.16    21.00       1.295

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       8.44   Tc(MIN.) =   13.31
 TOTAL AREA(ACRES) =        6.8
 LONGEST FLOWPATH FROM NODE    201.00 TO NODE    250.00 =    1287.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     46.95  DOWNSTREAM(FEET) =     46.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE =  0.0005
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.44
  FLOW VELOCITY(FEET/SEC.) =   0.72   FLOW DEPTH(FEET) =   0.55
  TRAVEL TIME(MIN.) =   2.29   Tc(MIN.) =   15.60
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    255.00 =    1386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    43.50  DOWNSTREAM(FEET) =    43.40
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.12
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.44
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   15.99
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    260.00 =    1459.00 FEET.

+--------------------------------------------------------------------------+
| NOTES:                                                                   |
| NODES 2001 THRU 2005: FOR OFF-SITE HALF STREET IMPROVEMENT               |
| SUPPORTING OFF-SITE HALF STREET HYDROLOGIC CALCULATIONS                  |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   2001.00 TO NODE   2005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   425.00
  UPSTREAM ELEVATION(FEET) =     65.00
  DOWNSTREAM ELEVATION(FEET) =     61.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  TC = 0.303*[(  425.00**3)/(     4.00)]**.2 =    8.674
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.953
```

```
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8789
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.86
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.86
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      8.67
  PEAK FLOW RATE(CFS)   =       0.86
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1717

                          Analysis prepared by:

                          SDH & ASSOCIATES, INC.
                           27363 VIA INDUSTRIA
                            TEMECULA, CA 92590
                              (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* PHELAN-SEATON (JN 1916)                                                *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 100                                                              *
 **************************************************************************

  FILE NAME: PS1HP00.RAT
  TIME/DATE OF STUDY: 16:37 01/20/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.787
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.140
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.370
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4648244
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4629036
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.370
  SLOPE OF INTENSITY DURATION CURVE = 0.4629
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  UPSTREAM ELEVATION(FEET) =     81.00
  DOWNSTREAM ELEVATION(FEET) =     80.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  TC = 0.303*[(  260.00**3)/(     1.00)]**.2 =    8.523
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.381
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8865
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.30
  TOTAL AREA(ACRES) =      1.10   TOTAL RUNOFF(CFS) =      3.30

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    109.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    79.00  DOWNSTREAM(FEET) =    78.00
  FLOW LENGTH(FEET) =   470.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.45
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.30
  PIPE TRAVEL TIME(MIN.) =   3.20    Tc(MIN.) =   11.72
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    109.00 =     730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.918
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8847
  SOIL CLASSIFICATION IS "C"
```

```
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    6.97
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =      10.27
  TC(MIN.) =   11.72

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.00  DOWNSTREAM(FEET) =    54.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.61
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.27
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.92
  TOTAL STREAM AREA(ACRES) =     3.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.27

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    62.00
  UPSTREAM ELEVATION(FEET) =     62.30
  DOWNSTREAM ELEVATION(FEET) =     57.50
  ELEVATION DIFFERENCE(FEET) =      4.80
  TC = 0.303*[(   62.00**3)/(     4.80)]**.2 =    2.635
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.328
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8891
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.15
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      1.15
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.33
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.27    11.74        2.916          3.80
      2        1.15     5.00        4.328          0.30

 **********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.53     5.00       4.328
      2       11.04    11.74       2.916

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.04   Tc(MIN.) =   11.74
  TOTAL AREA(ACRES) =        4.1
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    54.50  DOWNSTREAM(FEET) =    50.30
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
```

```
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.04
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =   12.80
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.801
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8841
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.24
  TOTAL AREA(ACRES) =        4.6   TOTAL RUNOFF(CFS) =      12.28
  TC(MIN.) =   12.80

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.30  DOWNSTREAM(FEET) =    49.40
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.28
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =    1291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.779
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8840
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =    7.37
  TOTAL AREA(ACRES) =        7.6   TOTAL RUNOFF(CFS) =      19.65
  TC(MIN.) =   13.02

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.40  DOWNSTREAM(FEET) =    49.30
  FLOW LENGTH(FEET) =     4.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.00
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.65
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =    1295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.40  DOWNSTREAM(FEET) =    49.30
  FLOW LENGTH(FEET) =     4.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.65
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.03
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.778
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8840
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.98
  TOTAL AREA(ACRES) =        8.0   TOTAL RUNOFF(CFS) =      20.64
  TC(MIN.) =   13.03

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.30  DOWNSTREAM(FEET) =    49.20
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.012
```

```
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.64
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.64
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.15
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    140.00 =    1332.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.20  DOWNSTREAM(FEET) =    48.50
  FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.64
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    145.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.55
  RAINFALL INTENSITY(INCH/HR) =   2.73
  TOTAL STREAM AREA(ACRES) =     8.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.64

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   204.00
  UPSTREAM ELEVATION(FEET) =     56.50
  DOWNSTREAM ELEVATION(FEET) =     53.30
  ELEVATION DIFFERENCE(FEET) =      3.20
```

```
  TC = 0.303*[(  204.00**3)/(     3.20)]**.2 =    5.839
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.028
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8883
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.43
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.43

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    145.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.30  DOWNSTREAM(FEET) =    48.50
  FLOW LENGTH(FEET) =    32.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.56
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.43
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.89
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    145.00 =     236.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.89
  RAINFALL INTENSITY(INCH/HR) =   4.01
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       20.64    13.55        2.729          8.00
      2        1.43     5.89        4.010          0.40

 ********************************WARNING*************************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       10.41     5.89       4.010
      2       21.61    13.55       2.729

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.61   Tc(MIN.) =   13.55
  TOTAL AREA(ACRES) =        8.4
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    145.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    48.50  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.28
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.61
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.70
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =    1541.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     48.00  DOWNSTREAM(FEET) =     47.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   248.00   CHANNEL SLOPE =  0.0004
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.389
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8820
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.95
  AVERAGE FLOW DEPTH(FEET) =   1.05   TRAVEL TIME(MIN.) =   4.34
  Tc(MIN.) =   18.04
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.84
  TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =      22.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.06   FLOW VELOCITY(FEET/SEC.) =   0.96
```

```
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    160.00 =    1789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.04
 RAINFALL INTENSITY(INCH/HR) =   2.39
 TOTAL STREAM AREA(ACRES) =     8.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.45

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    62.00
 UPSTREAM ELEVATION(FEET) =     56.50
 DOWNSTREAM ELEVATION(FEET) =     53.20
 ELEVATION DIFFERENCE(FEET) =      3.30
 TC = 0.303*[(   62.00**3)/(     3.30)]**.2 =    2.840
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.328
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8891
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    51.20  DOWNSTREAM(FEET) =    48.00
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.61
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.38
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.09
 LONGEST FLOWPATH FROM NODE    133.00 TO NODE    135.00 =      96.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    135.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     48.00  DOWNSTREAM(FEET) =     47.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =    40.00   CHANNEL SLOPE =  0.0025
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.38
 FLOW VELOCITY(FEET/SEC.) =   0.34   FLOW DEPTH(FEET) =   0.06
 TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =    7.05
 LONGEST FLOWPATH FROM NODE    133.00 TO NODE    160.00 =     136.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.05
 RAINFALL INTENSITY(INCH/HR) =   3.69
 TOTAL STREAM AREA(ACRES) =     0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.38

 ** CONFLUENCE DATA **
 STREAM     RUNOFF        Tc       INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       22.45    18.04        2.389          8.80
     2        0.38     7.05        3.692          0.10

 *********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 *************************************************************************

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        9.15     7.05       3.692
     2       22.70    18.04       2.389

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      22.70   Tc(MIN.) =   18.04
```

```
  TOTAL AREA(ACRES) =        8.9
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    160.00 =    1789.00 FEET.

+----------------------------------------------------------------------------+
| NOTES:                                                                     |
| NODES 1001 THRU 1005: FOR OFF-SITE HALF STREET IMPROVEMENT                 |
| SUPPORTING OFF-SITE HALF STREET HYDROLOGIC CALCULATIONS                    |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   415.00
  UPSTREAM ELEVATION(FEET) =     65.10
  DOWNSTREAM ELEVATION(FEET) =     62.00
  ELEVATION DIFFERENCE(FEET) =      3.10
  TC = 0.303*[(  415.00**3)/(     3.10)]**.2 =    8.998
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.297
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8862
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.46
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.46

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1005.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   51.50
  STREET LENGTH(FEET) =   870.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
```

```
  HALFSTREET FLOOD WIDTH(FEET) =   11.42
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.50
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
 STREET FLOW TRAVEL TIME(MIN.) =   5.80   Tc(MIN.) =   14.80
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.619
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8832
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.16
 TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       5.63

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.82
 FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
 LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1005.00 =    1285.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.3  TC(MIN.) =     14.80
 PEAK FLOW RATE(CFS)   =       5.63
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1717

                         Analysis prepared by:

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                          27363 VIA INDUSTRIA
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 ************************* DESCRIPTION OF STUDY *************************
* PHELAN-SEATON (JN 1916)                                                *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 200                                                              *
 **************************************************************************

  FILE NAME: PS2HP00.RAT
  TIME/DATE OF STUDY: 11:19 09/22/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.787
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.140
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.370
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4648244
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4629036
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.370
  SLOPE OF INTENSITY DURATION CURVE = 0.4629
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   340.00
  UPSTREAM ELEVATION(FEET) =     62.50
  DOWNSTREAM ELEVATION(FEET) =     56.20
  ELEVATION DIFFERENCE(FEET) =      6.30
  TC = 0.303*[(  340.00**3)/(     6.30)]**.2 =    6.928
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.721
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8875
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.65
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.65

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    205.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   56.20  DOWNSTREAM ELEVATION(FEET) =   54.55
  STREET LENGTH(FEET) =   317.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.62
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   3.14   Tc(MIN.) =   10.07
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.130
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8855
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.94
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.64
  FLOW VELOCITY(FEET/SEC.) =  1.81   DEPTH*VELOCITY(FT*FT/SEC.) =   0.72
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    205.00 =     657.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.45  DOWNSTREAM(FEET) =    47.20
  FLOW LENGTH(FEET) =   625.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.32
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.59
  PIPE TRAVEL TIME(MIN.) =   2.41    Tc(MIN.) =   12.48
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    220.00 =    1282.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.834
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8843
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    6.01
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       9.61
  TC(MIN.) =   12.48

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.20  DOWNSTREAM(FEET) =    46.95
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.88
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       9.61
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   12.49
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    250.00 =    1287.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.49
  RAINFALL INTENSITY(INCH/HR) =   2.83
  TOTAL STREAM AREA(ACRES) =     3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.61

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   345.00
  UPSTREAM ELEVATION(FEET) =     54.40
  DOWNSTREAM ELEVATION(FEET) =     52.00
  ELEVATION DIFFERENCE(FEET) =      2.40
  TC = 0.303*[(  345.00**3)/(     2.40)]**.2 =    8.477
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.390
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8865
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.70
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.70

****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    240.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   52.00  DOWNSTREAM ELEVATION(FEET) =   49.46
  STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   15.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   3.63   Tc(MIN.) =   12.11
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.874
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8845
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.08
  TOTAL AREA(ACRES) =        2.9        PEAK FLOW RATE(CFS) =       7.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.21
  FLOW VELOCITY(FEET/SEC.) =  2.27   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE    231.00 TO NODE    240.00 =     792.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.07  DOWNSTREAM(FEET) =    47.00
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.79
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.20
  LONGEST FLOWPATH FROM NODE    231.00 TO NODE    245.00 =     814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     47.00  DOWNSTREAM(FEET) =     46.95
  CHANNEL LENGTH THRU SUBAREA(FEET) =   222.00   CHANNEL SLOPE =  0.0002
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.336
```

```
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8816
 SOIL CLASSIFICATION IS "C"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.55
 AVERAGE FLOW DEPTH(FEET) =   0.69   TRAVEL TIME(MIN.) =   6.74
 Tc(MIN.) =   18.94
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.62
 TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =       8.41

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE    231.00 TO NODE    250.00 =    1036.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.94
 RAINFALL INTENSITY(INCH/HR) =   2.34
 TOTAL STREAM AREA(ACRES) =     3.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.41

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        9.61    12.49        2.833          3.60
     2        8.41    18.94        2.336          3.20

 ********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       15.15    12.49       2.833
     2       16.33    18.94       2.336

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.15   Tc(MIN.) =   12.49
 TOTAL AREA(ACRES) =        6.8
```

```
 LONGEST FLOWPATH FROM NODE    201.00 TO NODE    250.00 =    1287.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     46.95  DOWNSTREAM(FEET) =     46.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE =  0.0005
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      15.15
 FLOW VELOCITY(FEET/SEC.) =   0.90   FLOW DEPTH(FEET) =   0.78
 TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   14.32
 LONGEST FLOWPATH FROM NODE    201.00 TO NODE    255.00 =    1386.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    43.50  DOWNSTREAM(FEET) =    43.40
 FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.12
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.15
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   14.71
 LONGEST FLOWPATH FROM NODE    201.00 TO NODE    260.00 =    1459.00 FEET.

+--------------------------------------------------------------------------+
| NOTES:                                                                   |
| NODES 2001 THRU 2005: FOR OFF-SITE HALF STREET IMPROVEMENT               |
| SUPPORTING OFF-SITE HALF STREET HYDROLOGIC CALCULATIONS                  |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   2001.00 TO NODE   2005.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   425.00
 UPSTREAM ELEVATION(FEET) =     65.00
```

```
  DOWNSTREAM ELEVATION(FEET) =     61.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  TC = 0.303*[(  425.00**3)/(     4.00)]**.2 =    8.674
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.354
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8864
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.49
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.49
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      8.67
  PEAK FLOW RATE(CFS)   =       1.49
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix C

Inlet Sizing

Note: Detailed inlet calculations for other catch basins will be conducted during final engineering and will be incorporated in this Appendix.

Appendix D

Preliminary Storm Drain Sizing

Phelan-Seaton
Job # 1916
Revised: 9/22/2021

Preliminary Storm Drain Size

The purpose of this table is to provide an estimated pipe sizes to convey the anticipated private on-site 10-year peak flow rates with a preliminary sizing bump-up factor to account for potential head losses through the pipe.

Manning's n: 0.012 HDPE or equivalent

Preliminary Sizing Bump-up (%): 30

			Preliminary Sizes per Varying Slopes						
		Slope at:	0.2%		0.5%		1.0%		
Node ID's:	**Q_{10} (cfs[1])**	**Q_{100} with Sizing Factor (cfs[1])**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size [2] (feet)**	**Recommended Pipe Size (inches)**	**RECOMMENDATIONS[3]**
110 - 115	6.4	8.3	1.80	24"	1.52	24"	1.33	18"	**Use 18" HDPE @ 1.0% MIN.**
115 - 120	7.1	9.2	1.87	24"	1.58	24"	1.39	18"	**Use 18" HDPE @ 1.0% MIN.**
120 - 130	11.3	14.7	2.23	30"	1.88	24"	1.65	24"	**Use 24" HDPE @ 0.5% MIN.**
125 - 130	0.6	0.8	0.74	10"	0.62	8"	0.55	8"	**Use 12" HDPE @ 0.5% MIN.**
130 - 140	11.9	15.5	2.27	30"	1.91	24"	1.68	24"	**Use 24" HDPE @ 0.5% MIN.**
140 - 145	11.9	15.5	2.27	30"	1.91	24"	1.68	24"	**Use 24" HDPE @ 0.5% MIN.**
132 - 145	0.8	1.0	0.83	10"	0.70	10"	0.61	8"	**Use 12" HDPE @ 1.0% MIN.**
134 - 135	0.2	0.3	0.49	6"	0.41	6"	0.36	6"	**Use 12" HDPE @ 1.0% MIN.**
145 - 150	12.4	16.1	2.31	30"	1.94	24"	1.71	24"	**Use 24" HDPE @ 1.0% MIN.**
205 - 220	2.1	2.7	1.19	18"	1.00	12"	0.88	12"	**Use 18" HDPE @ 0.5% MIN.**
220 - 250	5.4	7.0	1.69	24"	1.42	18"	1.25	18"	**Use 18" HDPE @ 1.0% MIN.**
240 - 245	4.4	5.7	1.57	24"	1.32	18"	1.16	18"	**Use 18" HDPE @ 0.5% MIN.**
255 - 260	8.4	10.9	2.00	24"	1.68	24"	1.48	18"	**Use 24" HDPE @ 0.2% MIN.**

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with 30% factor to account for potential head losses through the storm drain pipes.
3. The on-site storm drain systems are private and this level of calculation (per normal depth) should suffice for sizing purpose. If needed, additional supporting calculations may be performed during final engineering to validate the required sizes.

```
T1 PHELAN-SEATON; CAJALCO ROAD STORM DRAIN EXTENSION                          0
T2 LINE E-8 EXTENSION - 24-INCH RCP; CONNECTION TO PPT190006 SD PLANS (PER SHT 9
T3 ANTICIPATED STARTING STA. ~19+27.06; FL ~1516.14; HGL ~1517.2
SO   1927.0601516.140  1                          1517.200
R    3205.0601537.000  1      .013                                  .000    .000 0
JX   3210.5601537.100  2      .013                                     -30.000
R    3294.5601541.000  2      .013                                  .000    .000 0
SH   3294.5601541.000  2                          1541.000
CD   1  4   1    .000   2.000     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            23.500   .0
```

Program Package Serial Number: 7353

WATER SURFACE PROFILE LISTING Date: 9-16-2021 Time: 4:17:52

PHELAN-SEATON; CAJALCO ROAD STORM DRAIN EXTENSION
LINE E-8 EXTENSION - 24-INCH RCP; CONNECTION TO PPT190006 SD PLANS (PER
SH ANTICIPATED STARTING STA. ~19+27.06; FL ~1516.14; HGL ~1517.2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1927.060	1516.140	1.369	1517.509	23.50	10.25	1.63	1519.14	.00	1.72	1.86	2.000	.000	.00	1 .0
1018.099	.0163					.0163	16.62	1.37	1.63	1.37	.013	.00	.00	PIPE
2945.159	1532.758	1.369	1534.127	23.50	10.25	1.63	1535.76	.00	1.72	1.86	2.000	.000	.00	1 .0
100.048	.0163					.0164	1.64	1.37	1.63	1.37	.013	.00	.00	PIPE
3045.207	1534.391	1.366	1535.757	23.50	10.28	1.64	1537.40	.00	1.72	1.86	2.000	.000	.00	1 .0
95.599	.0163					.0174	1.67	1.37	1.63	1.37	.013	.00	.00	PIPE
3140.806	1535.951	1.309	1537.260	23.50	10.78	1.80	1539.06	.00	1.72	1.90	2.000	.000	.00	1 .0
38.566	.0163					.0196	.76	1.31	1.77	1.37	.013	.00	.00	PIPE
3179.372	1536.581	1.256	1537.837	23.50	11.31	1.98	1539.82	.00	1.72	1.93	2.000	.000	.00	1 .0
25.688	.0163					.0221	.57	1.26	1.92	1.37	.013	.00	.00	PIPE
3205.060	1537.000	1.207	1538.207	23.50	11.86	2.18	1540.39	2.00	1.72	1.96	2.000	.000	.00	1 .0
JUNCT STR	.0182					.0312	.17	2.00	2.08		.013	.00	.00	PIPE
3210.561	1537.100	1.031	1538.131	23.50	14.40	3.22	1541.35	.00	1.72	2.00	2.000	.000	.00	1 .0
23.566	.0464					.0370	.87	1.03	2.81	.98	.013	.00	.00	PIPE
3234.126	1538.194	1.065	1539.259	23.50	13.81	2.96	1542.22	.00	1.72	2.00	2.000	.000	.00	1 .0
16.760	.0464					.0329	.55	1.07	2.64	.98	.013	.00	.00	PIPE
3250.886	1538.972	1.107	1540.079	23.50	13.17	2.69	1542.77	.00	1.72	1.99	2.000	.000	.00	1 .0
11.585	.0464					.0290	.34	1.11	2.45	.98	.013	.00	.00	PIPE

PHELAN-SEATON; CAJALCO ROAD STORM DRAIN EXTENSION
LINE E-8 EXTENSION - 24-INCH RCP; CONNECTION TO PPT190006 SD PLANS (PER
SH ANTICIPATED STARTING STA. ~19+27.06; FL ~1516.14; HGL ~1517.2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3262.471	1539.510	1.150	1540.660	23.50	12.56	2.45	1543.11	.00	1.72	1.98	2.000	.000	.00	1 .0
8.442	.0464					.0256	.22	1.15	2.27	.98	.013	.00	.00	PIPE
3270.913	1539.902	1.197	1541.099	23.50	11.97	2.23	1543.32	.00	1.72	1.96	2.000	.000	.00	1 .0
6.459	.0464					.0227	.15	1.20	2.11	.98	.013	.00	.00	PIPE
3277.372	1540.202	1.246	1541.448	23.50	11.42	2.02	1543.47	.00	1.72	1.94	2.000	.000	.00	1 .0
5.013	.0464					.0201	.10	1.25	1.95	.98	.013	.00	.00	PIPE
3282.385	1540.435	1.298	1541.733	23.50	10.88	1.84	1543.57	.00	1.72	1.91	2.000	.000	.00	1 .0
3.893	.0464					.0179	.07	1.30	1.80	.98	.013	.00	.00	PIPE
3286.278	1540.615	1.354	1541.970	23.50	10.38	1.67	1543.64	.00	1.72	1.87	2.000	.000	.00	1 .0
3.014	.0464					.0159	.05	1.35	1.66	.98	.013	.00	.00	PIPE
3289.292	1540.755	1.414	1542.169	23.50	9.89	1.52	1543.69	.00	1.72	1.82	2.000	.000	.00	1 .0
2.271	.0464					.0142	.03	1.41	1.53	.98	.013	.00	.00	PIPE
3291.563	1540.861	1.479	1542.340	23.50	9.43	1.38	1543.72	.00	1.72	1.76	2.000	.000	.00	1 .0
1.622	.0464					.0127	.02	1.48	1.40	.98	.013	.00	.00	PIPE
3293.185	1540.936	1.550	1542.486	23.50	8.99	1.26	1543.74	.00	1.72	1.67	2.000	.000	.00	1 .0
1.008	.0464					.0115	.01	1.55	1.27	.98	.013	.00	.00	PIPE
3294.193	1540.983	1.629	1542.612	23.50	8.58	1.14	1543.75	.00	1.72	1.55	2.000	.000	.00	1 .0
.367	.0464					.0105	.00	1.63	1.14	.98	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING Date: 9-16-2021 Time: 4:17:52

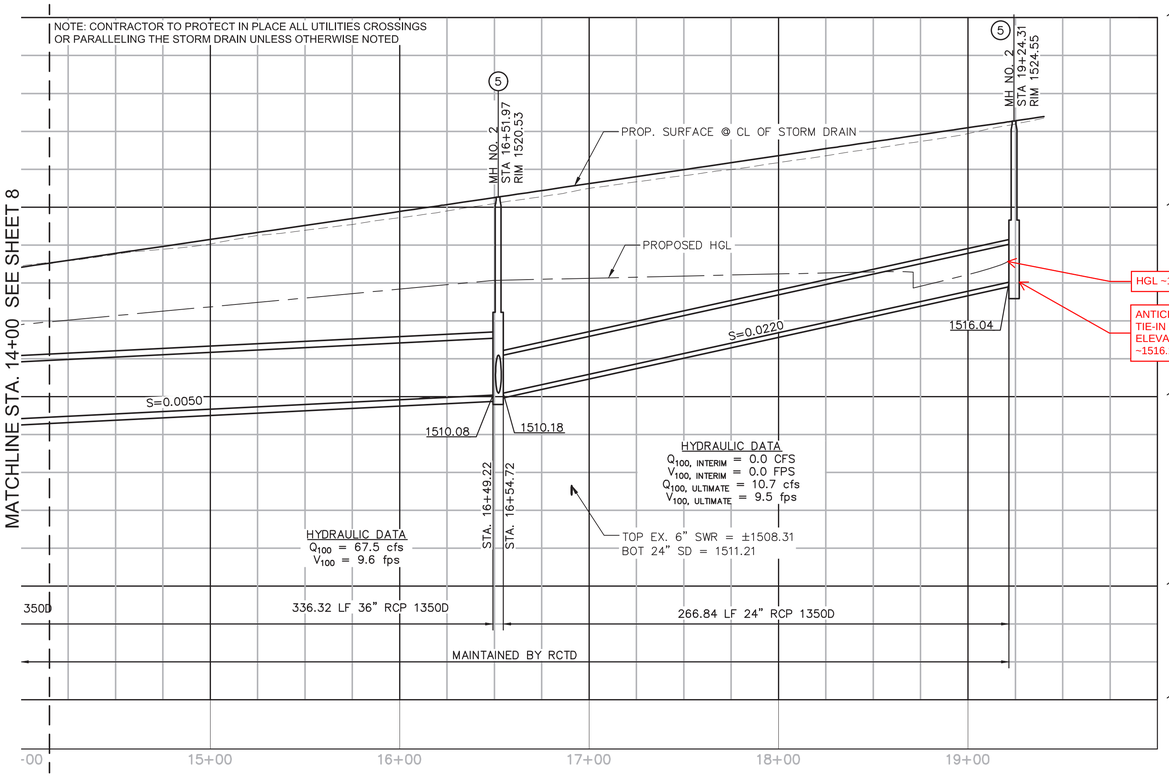
PHELAN-SEATON; CAJALCO ROAD STORM DRAIN EXTENSION
LINE E-8 EXTENSION - 24-INCH RCP; CONNECTION TO PPT190006 SD PLANS (PER
SH ANTICIPATED STARTING STA. ~19+27.06; FL ~1516.14; HGL ~1517.2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3294.560	1541.000	1.721	1542.721	23.50	8.17	1.04	1543.76	.00	1.72	1.39	2.000	.000	.00	1 .0

HGL @ BIORETENTION
FACILITY OUTLET STRUCTURE

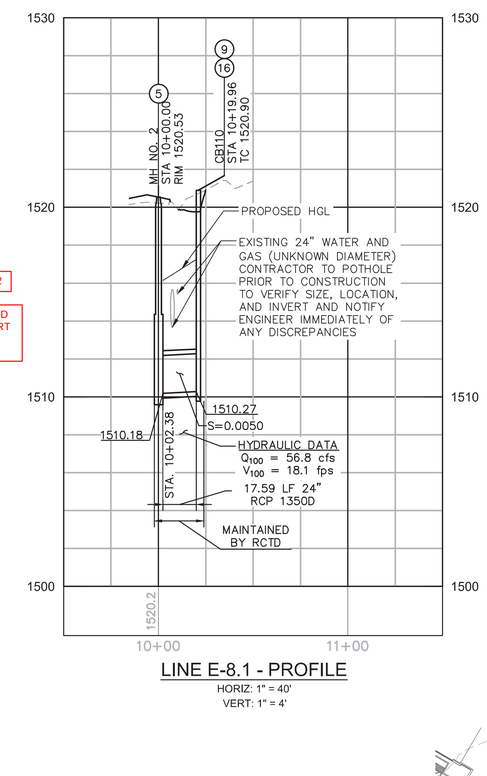
NOTE: CONTRACTOR TO PROTECT IN PLACE ALL UTILITIES CROSSINGS OR PARALLELING THE STORM DRAIN UNLESS OTHERWISE NOTED

MATCHLINE STA. 14+00 SEE SHEET 8



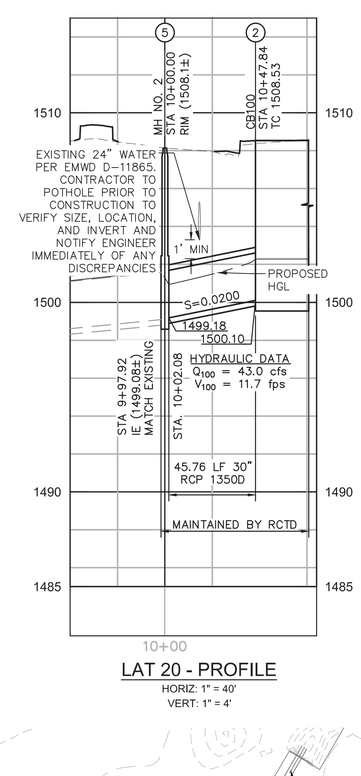
LINE E-8 - PROFILE

HORIZ: 1" = 40'
VERT: 1" = 4'



LINE E-8.1 - PROFILE

HORIZ: 1" = 40'
VERT: 1" = 4'



LAT 20 - PROFILE

HORIZ: 1" = 40'
VERT: 1" = 4'

STORM DRAIN CONSTRUCTION NOTES

(2) CONSTRUCT CATCH BASIN NO. 1 PER RCFC&WCD CB100 WITH LOCAL DEPRESSION PER LD201, W=28', V=8.43'

(3) CONSTRUCT 36" RCP. D LOAD PER PROFILE

(4) CONSTRUCT 24" RCP. D LOAD PER PROFILE

(5) CONSTRUCT MANHOLE NO. 2 PER RCFC&WCD MH 252

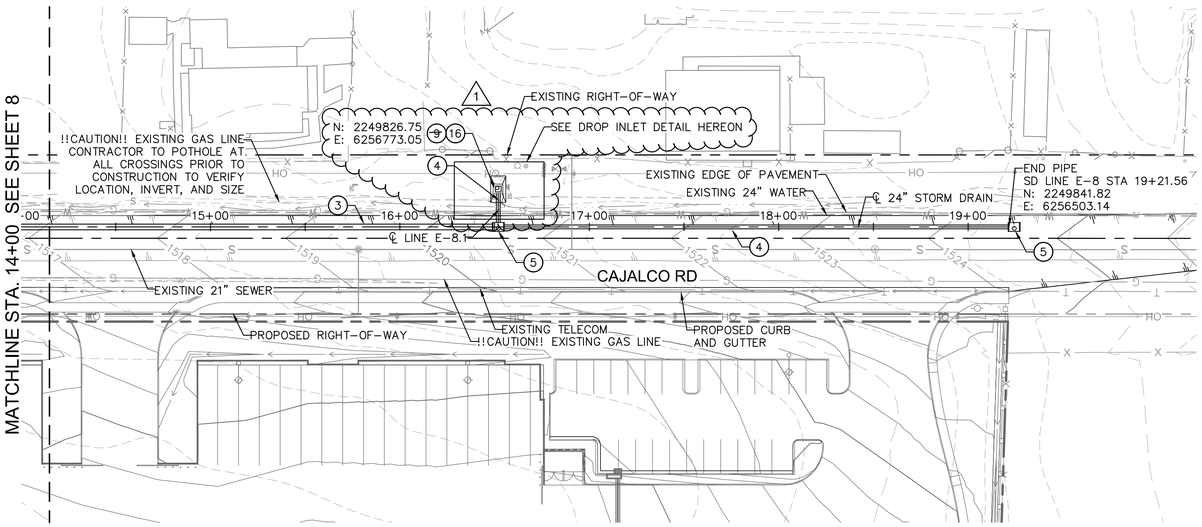
(6) REMOVE EXISTING 30" RCP AND CURB INLET

(8) CONSTRUCT 30" RCP, 1350D

(9) ~~INSTALL FOSGIL FILTER PER COUNTY OF RIVERSIDE STD. NO. 308A~~

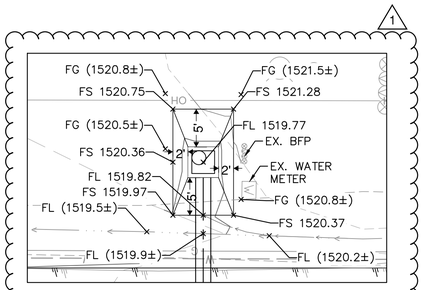
(16) CONSTRUCT CONCRETE DROP INLET PER RCFC&WCD CB110 (2 OPENINGS, NORTH & SOUTH SIDE) AND CONSTRUCT 3" AC APRON.

MH NO. 2		
	LINE E-8	LAT 20
	STA 16+20	STA 16+20
D1 =	24"	30"
D2 =	36"	30"
A =	90°	±24°
B =	24"	N/A
EL S =	1510.18	N/A
EL R =	1510.18	N/A



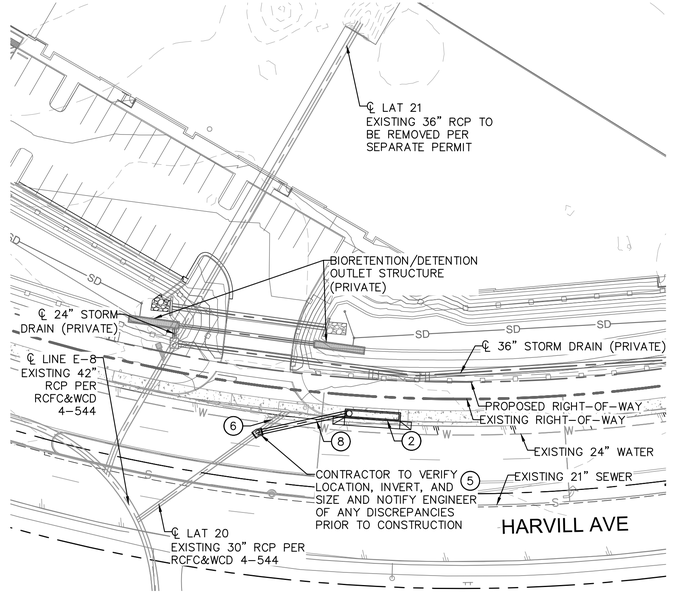
MATCHLINE STA. 14+00 SEE SHEET 8

LINE E-8 - PLAN



DROP INLET DETAIL

SCALE 1"=10'



NORTH

LAT 20 - PLAN

GRAPHIC SCALE IN FEET
0 20 40 80 160

COUNTY OVERSIGHT ENGINEER: BENJIE CHO | REGISTRATION #: 76450 | DATE SIGNED: 11/16/2020

APPROVED AS TO COMPLIANCE WITH APPLICABLE COUNTY STANDARDS AND PRACTICES.

DIGALERT — CALL BEFORE YOU DIG — DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG — TOLL FREE 1-800-422-4133 — A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

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

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

MARK	BY	DATE	REVISIONS	APPR.	DATE
1	KHA	12/09/20	Revisions to drop inlet concrete apron	BEC	12/10/20

ENGINEER | COUNTY

SEAL – ENGINEER
REGISTERED PROFESSIONAL ENGINEER — ROBERTO R. RUIZ-SALAS — NO. 81946 — Exp. 03-31-2022 — CIVIL — STATE OF CALIFORNIA

Kimley»Horn
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
PHONE: (619) 234-9411
WWW.KIMLEY-HORN.COM

PREPARED UNDER THE SUPERVISION OF:
ROBERTO R. RUIZ-SALAS

DESIGNED BY: RRS CHECKED BY: PR
R.C.E. NO.: 81946
DATE: 08-13-2020

SCALE: H: 1"=40' V: 1"=10'

BENCHMARK:
A STANDARD 3-1/4 INCH NGS BENCHMARK #435 STAMPED "B.M. 435" LOCATED 315 FEET WEST HARVILL AVENUE ALONG RIDER STREET, ON TOP OF NORTH CURB

DATUM: NAVD 88
ELEVATION 1515.12

PPT190006 I.P.200027

COUNTY OF RIVERSIDE
STORM DRAIN PLANS
VAL VERDE LOGISTICS CENTER
LINE E-8 PLAN AND PROFILE

FOR: | W.O. | COUNTY FILE NO. 969E

SHEET NO. 9 OF 9 SHEETS

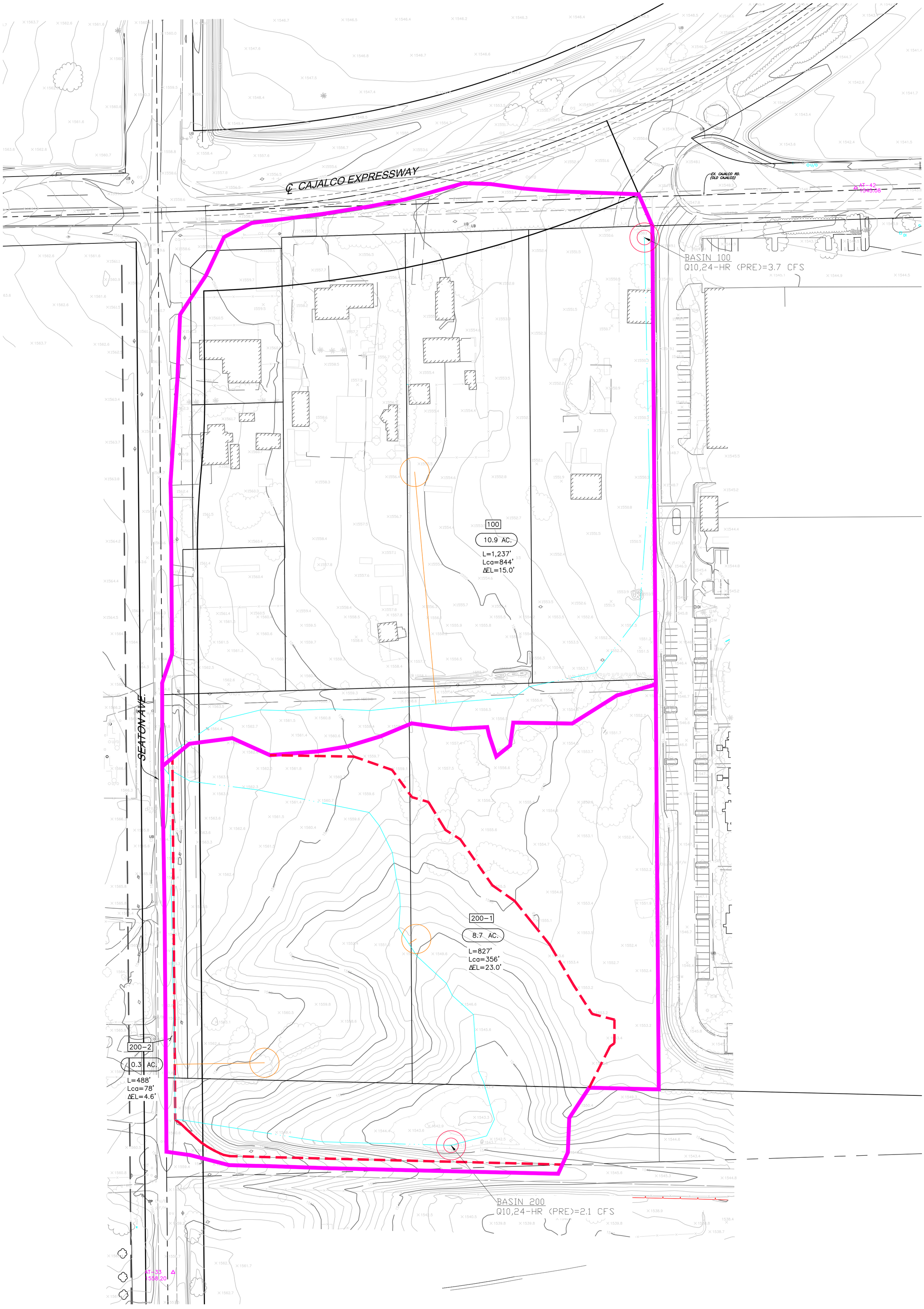
PLAN AND PROFILE

Appendix E

Preliminary Detention Calculation

Includes:

1. HMS workmaps (pre-project and post-project)
2. NOAA Atlas 14 precipitation data
3. Proposed BMP typical section details
4. Proposed BMP rating curve information
5. HMS key summary / output
6. Pre-processor supporting materials (loss rate, effective rainfall, S-graph)



NOTES:

1. *THIS HEC-HMS WORKMAP IS PREPARED IN SUPPORT OF THE ON-SITE PRELIMINARY DETENTION CALCULATION FOR 10-YEAR, 24-HOUR STORM EVENT, IN AN EFFORT TO MITIGATE THE POST-PROJECT PEAK FLOW BACK TO THE PRE-PROJECT CONDITION LEVEL AND ADDRESS THE RCFC'S INCREASED RUNOFF CRITERIA. DURING THE FINAL ENGINEERING, THE OTHER REMAINING STORM EVENTS/DURATIONS WILL BE ANALYZED.*

LEGEND

- *TRACT BOUNDARY*
- *MAJOR DRAIN BOUNDARY*
- *SUB BASIN BOUNDARY*
- *FLOW PATH*
- *ACREAGE* — X.X AC.
- *BASIN ID* — XXX
- *CENTROID LOCATION*
- *POINT OF INTEREST*

N

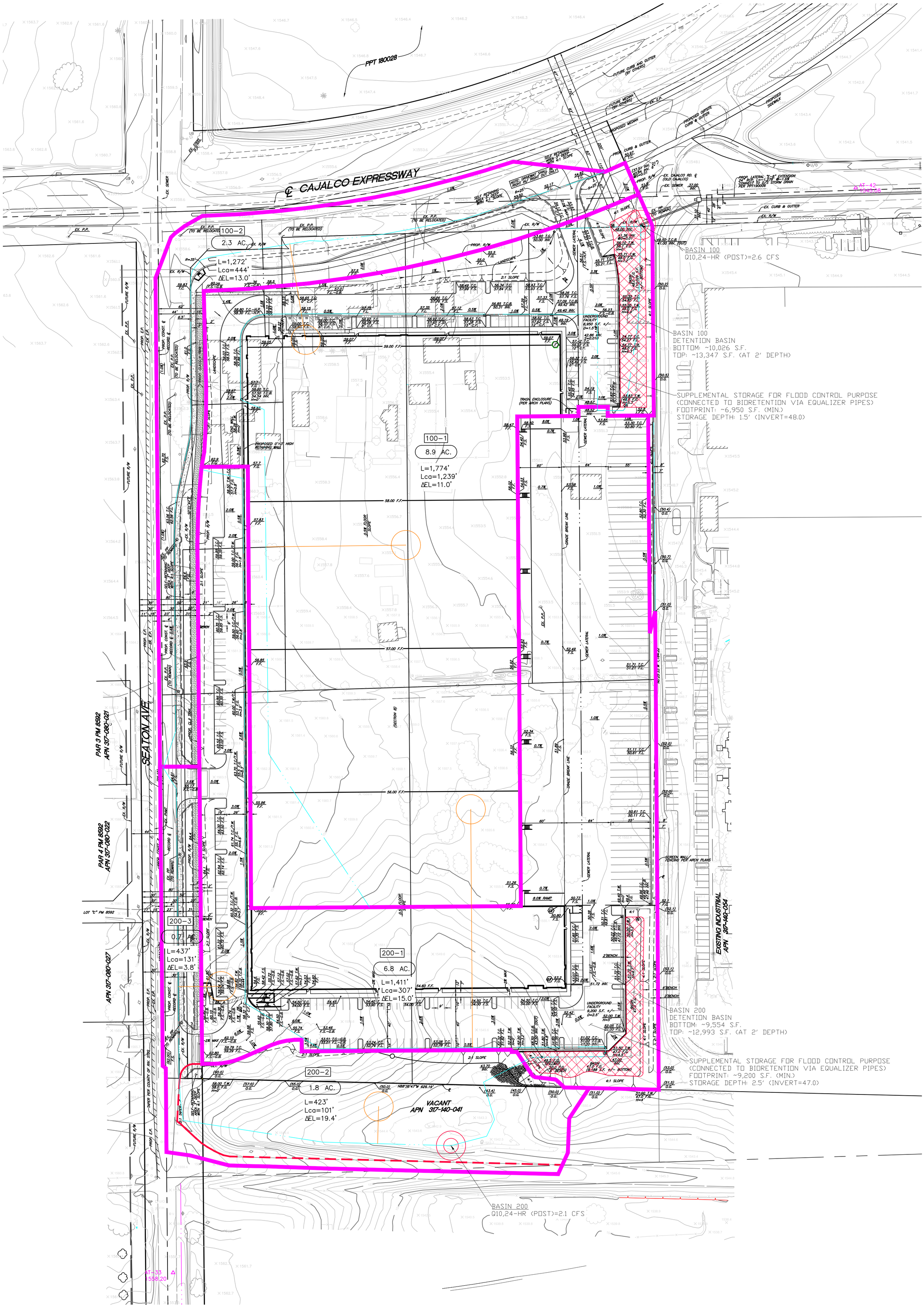
0 30 60 120 180 240

SCALE 1"=60'

HEC-HMS WORKMAP FOR PHELAN - SEATON (PRE-PROJECT) PPT210133

JN 1916 REVISED DATE: 1/21/2022

NOT FOR CONSTRUCTION – EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY



NOTES:

1. THIS HEC-HMS WORKMAP IS PREPARED IN SUPPORT OF THE ON-SITE PRELIMINARY DETENTION CALCULATION FOR 10-YEAR, 24-HOUR STORM EVENT, IN AN EFFORT TO MITIGATE THE POST-PROJECT PEAK FLOW BACK TO THE PRE-PROJECT CONDITION LEVEL AND ADDRESS THE RCFC'S INCREASED RUNOFF CRITERIA. DURING THE FINAL ENGINEERING, THE OTHER REMAINING STORM EVENTS/DURATIONS WILL BE ANALYZED.

LEGEND

- TRACT BOUNDARY
- MAJOR DRAIN BOUNDARY
- SUB BASIN BOUNDARY
- FLOW PATH
- ACREAGE — X.X AC.
- BASIN ID — XXX
- CENTROID LOCATION
- POINT OF INTEREST

0 30 60 120 180 240

SCALE 1"=60'

HEC-HMS WORKMAP FOR PHELAN - SEATON (POST-PROJECT) PPT210133

JN 1916 REVISED DATE: 1/21/2022

NOT FOR CONSTRUCTION - EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY

S:_SDH DRAWINGS\PHELAN-SEATON\WR\HMS Exhibit Post.dwg 2022-01-21 - 2:05PM - SDH

Phelan-Seaton Reference Material - NOAA Atlas 14 Precipitation Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Perris, California, USA*
Latitude: 33.8362°, Longitude: -117.2605°
Elevation: 1556.53 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.087 (0.073-0.106)	0.122 (0.102-0.147)	0.169 (0.141-0.205)	0.210 (0.173-0.257)	0.268 (0.214-0.340)	0.315 (0.246-0.408)	0.365 (0.278-0.486)	0.420 (0.310-0.575)	0.498 (0.352-0.712)	0.563 (0.384-0.834)
10-min	0.125 (0.105-0.151)	0.175 (0.146-0.211)	0.243 (0.202-0.294)	0.301 (0.248-0.368)	0.384 (0.306-0.487)	0.452 (0.352-0.585)	0.524 (0.398-0.696)	0.602 (0.444-0.824)	0.714 (0.505-1.02)	0.807 (0.550-1.20)
15-min	0.151 (0.127-0.183)	0.211 (0.176-0.255)	0.293 (0.244-0.356)	0.364 (0.300-0.445)	0.464 (0.370-0.589)	0.546 (0.426-0.708)	0.634 (0.482-0.842)	0.728 (0.537-0.996)	0.864 (0.610-1.23)	0.975 (0.665-1.45)
30-min	0.242 (0.202-0.292)	0.337 (0.281-0.408)	0.468 (0.390-0.568)	0.580 (0.479-0.710)	0.741 (0.591-0.939)	0.872 (0.680-1.13)	1.01 (0.768-1.34)	1.16 (0.857-1.59)	1.38 (0.974-1.97)	1.56 (1.06-2.31)
60-min	0.328 (0.274-0.396)	0.457 (0.382-0.553)	0.635 (0.529-0.771)	0.787 (0.650-0.963)	1.00 (0.801-1.27)	1.18 (0.922-1.53)	1.37 (1.04-1.82)	1.58 (1.16-2.16)	1.87 (1.32-2.67)	2.11 (1.44-3.13)
2-hr	0.493 (0.412-0.595)	0.658 (0.549-0.795)	0.880 (0.733-1.07)	1.07 (0.880-1.31)	1.33 (1.06-1.68)	1.53 (1.20-1.99)	1.75 (1.33-2.32)	1.98 (1.46-2.71)	2.30 (1.62-3.28)	2.55 (1.74-3.78)
3-hr	0.608 (0.508-0.735)	0.800 (0.668-0.967)	1.06 (0.879-1.28)	1.27 (1.05-1.55)	1.56 (1.25-1.98)	1.79 (1.40-2.32)	2.03 (1.55-2.70)	2.28 (1.69-3.12)	2.63 (1.86-3.76)	2.91 (1.98-4.30)
6-hr	0.859 (0.718-1.04)	1.12 (0.932-1.35)	1.46 (1.21-1.77)	1.74 (1.43-2.13)	2.12 (1.69-2.69)	2.42 (1.88-3.13)	2.72 (2.07-3.61)	3.03 (2.24-4.15)	3.47 (2.45-4.95)	3.80 (2.59-5.63)
12-hr	1.14 (0.949-1.37)	1.49 (1.24-1.80)	1.95 (1.62-2.36)	2.32 (1.92-2.84)	2.83 (2.26-3.59)	3.23 (2.52-4.18)	3.63 (2.76-4.82)	4.04 (2.99-5.53)	4.61 (3.26-6.58)	5.05 (3.44-7.48)
24-hr	1.48 (1.31-1.71)	1.98 (1.75-2.28)	2.62 (2.31-3.04)	3.15 (2.76-3.68)	3.87 (3.28-4.67)	4.43 (3.67-5.44)	4.99 (4.04-6.28)	5.57 (4.39-7.21)	6.36 (4.82-8.57)	6.98 (5.11-9.73)
2-day	1.72 (1.52-1.98)	2.33 (2.06-2.69)	3.14 (2.77-3.64)	3.81 (3.33-4.45)	4.73 (4.01-5.70)	5.45 (4.52-6.70)	6.18 (5.01-7.78)	6.94 (5.48-8.99)	7.99 (6.05-10.8)	8.82 (6.46-12.3)
3-day	1.83 (1.62-2.11)	2.51 (2.22-2.90)	3.42 (3.01-3.96)	4.17 (3.65-4.87)	5.22 (4.42-6.29)	6.04 (5.01-7.42)	6.88 (5.58-8.67)	7.77 (6.13-10.1)	9.01 (6.82-12.1)	9.99 (7.31-13.9)
4-day	1.96 (1.73-2.26)	2.71 (2.39-3.13)	3.72 (3.28-4.31)	4.56 (3.99-5.32)	5.73 (4.85-6.91)	6.65 (5.52-8.18)	7.61 (6.17-9.58)	8.62 (6.80-11.2)	10.0 (7.59-13.5)	11.1 (8.16-15.5)
7-day	2.14 (1.90-2.47)	3.01 (2.66-3.47)	4.17 (3.67-4.83)	5.14 (4.50-6.00)	6.50 (5.51-7.84)	7.58 (6.29-9.32)	8.70 (7.05-11.0)	9.89 (7.80-12.8)	11.5 (8.74-15.6)	12.9 (9.42-17.9)
10-day	2.23 (1.97-2.57)	3.15 (2.78-3.64)	4.40 (3.88-5.09)	5.45 (4.76-6.36)	6.92 (5.86-8.35)	8.10 (6.72-9.96)	9.32 (7.55-11.7)	10.6 (8.37-13.7)	12.4 (9.42-16.8)	13.9 (10.2-19.4)
20-day	2.59 (2.29-2.98)	3.70 (3.27-4.28)	5.25 (4.63-6.08)	6.57 (5.74-7.67)	8.45 (7.16-10.2)	9.98 (8.28-12.3)	11.6 (9.39-14.6)	13.3 (10.5-17.2)	15.8 (12.0-21.3)	17.8 (13.0-24.8)
30-day	2.96 (2.62-3.42)	4.24 (3.75-4.90)	6.04 (5.32-7.00)	7.60 (6.64-8.87)	9.86 (8.34-11.9)	11.7 (9.71-14.4)	13.7 (11.1-17.2)	15.8 (12.5-20.5)	19.0 (14.4-25.5)	21.5 (15.8-30.0)
45-day	3.45 (3.05-3.98)	4.90 (4.33-5.66)	6.97 (6.14-8.07)	8.79 (7.68-10.3)	11.5 (9.72-13.8)	13.7 (11.4-16.9)	16.2 (13.1-20.4)	18.9 (14.9-24.4)	22.9 (17.3-30.8)	26.2 (19.2-36.5)
60-day	3.91 (3.46-4.51)	5.48 (4.85-6.33)	7.76 (6.84-8.99)	9.79 (8.56-11.4)	12.8 (10.9-15.5)	15.4 (12.8-19.0)	18.3 (14.8-23.0)	21.5 (16.9-27.8)	26.3 (19.9-35.4)	30.4 (22.2-42.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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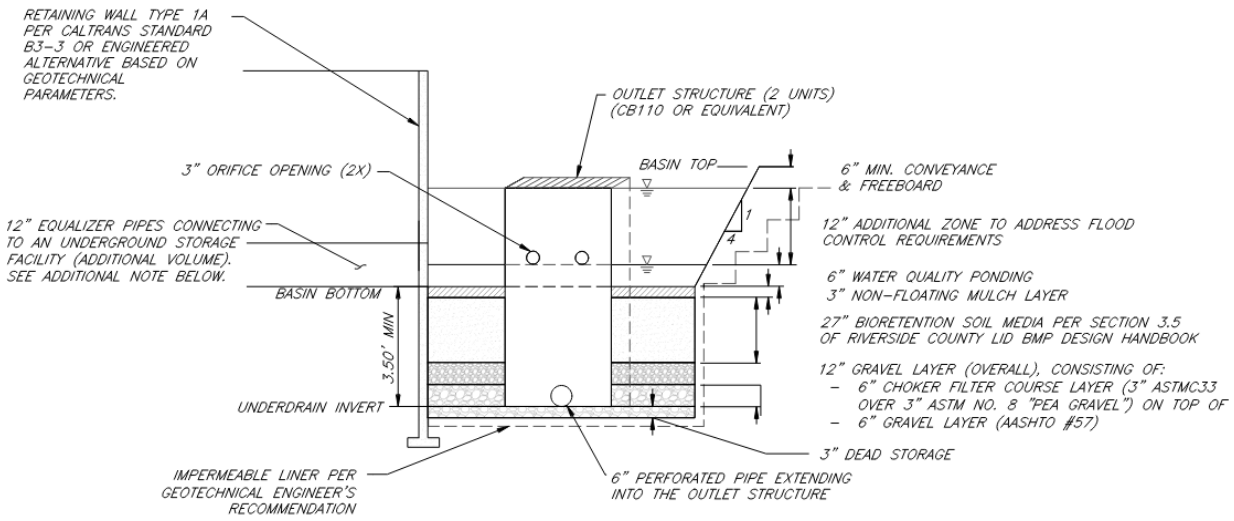
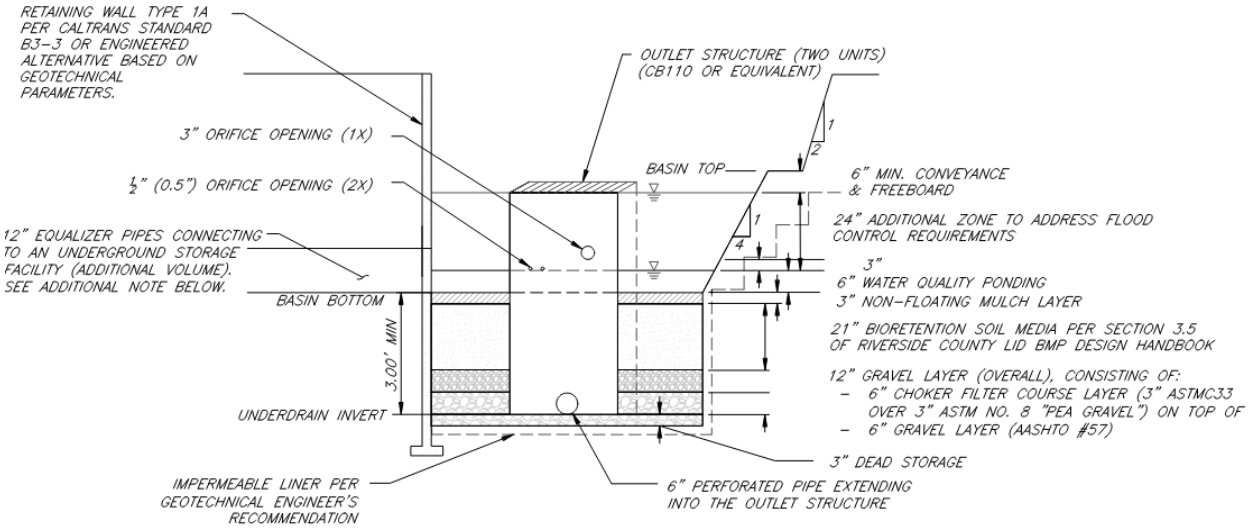
PF graphical



Basin 100 (BMP 1) – Bioretention Facility Typical Section Detail



Basin 200 (BMP 2) – Bioretention Facility Typical Section Detail

NOTE:
AS DIRECTED BY RCFC IN REGARDS TO ADDRESSING THE INCREASED RUNOFF MITIGATION CRITERIA, IT IS IMPORTANT TO NOTE THAT VOLUMES IN THE SUBSURFACE LAYERS OF THE PROPOSED BIORETENTION FACILITIES ARE NOT CONSIDERED. WHILE THE TYPICAL SECTIONS ABOVE SHOW THE PROPOSED BIORETENTION FACILITY SECTIONS IN ENTIRETY, ONLY THE VOLUMES IN THE ABOVEGROUND PORTION OF THE BIORETENTION FACILITIES ARE CONSIDERED FOR INCREASED RUNOFF MITIGATION ROUTING ANAYSIS. THE PROVIDED RATING CURVE (STAGE-STORAGE-DISCHARGE) SUMMARY TABLES REFLECT THIS CONDITION.

Phelan-Seaton
JN 1916
1/20/2022

BMP 1 - SUPPORTING STAGE-STORAGE-DISCHARGE RATING CURVE SUMMARY

BMP 1: Stage-Storage-Discharge Rating Curve Summary

Proposed BMP Outletwork Detail

Basin Characteristics	
WQ ponding depth (ft) =	0.50
Mulch layer (ft) =	0.25
Bioretention soil media (ft) =	2.25
Gravel choker layer (ft) =	0.50
Gravel layer (ft) =	0.50
Dead storage (ft)	0.25

Bottom surface area (ft2) =	10,026
Grade break elevation (ft) =	3.50
Surface area @ grade break (ft2) =	10,026
Top surface area (ft2) =	13,347

Additional Storage (If applicable)	
Starting Elevation (ft)	3.50
Top Elevation (ft)	5.00
Surface area (ft2) =	6,950

Low-flow Orifice (Restrictor)	
Num. of orifices =	1
Orifice invert elevation (ft) =	0.0
Orifice diameter (in) =	6.00

BSM Filtration Rate	
BSM Expected Filtration Rate (in/hr)	5.0

Mid-flow Orifice (1st)	
Num. of orifices =	1
Orifice invert elevation (ft) =	4
Orifice diameter (in) =	3.0

Overflow Outlet	
Outlet invert elevation (ft) =	5.00
B (ft) =	16.00

Orifice/Weir Coefficient	
Orifice coefficient, Cg =	0.60
Weir coefficient, Cs =	3.0

Overall System Rating Curve including Subsurface Layers

Stage-Discharge Summary

Elevation (ft)	Discharge (cfs)
0.00	**0.00**
1.00	**0.82**
3.25	**1.64**
3.50	**1.70**
4.00	**1.83**
4.25	**1.97**
5.00	**2.28**
5.50	**36.38**

Stage-Storage Summary

Elevation (ft)	Area (sf)	Porosity	Effective Surface Area (sf)	Storage (Cumulative) (ac-ft)
0.00	10026	0.40	4010	**0.000**
1.00	10026	0.30	3008	**0.090**
3.25	10026	0.30	3008	**0.246**
3.50	10026	1.00	10026	**0.276**
4.00	10856	1.00	10856	**0.477**
4.25	11271	1.00	11271	**0.580**
5.00	12517	1.00	12517	**0.906**
5.50	13347	1.00	13347	**1.055**

Modified Rating Curve for Riverside County Increase Runoff Mitigation Purpose (Aboveground Only)

Stage-Discharge Summary

Elevation (ft)	Discharge (cfs)
3.50	**0.00**
4.00	**1.16**
4.25	**1.24**
5.00	**1.38**
5.50	**35.38**

Stage-Storage Summary

Elevation (ft)	Area (sf)	Porosity	Effective Surface Area (sf)	Storage (Cumulative) (ac-ft)
3.50	10026	1.00	10026	**0.000**
4.00	10856	1.00	10856	**0.200**
4.25	11271	1.00	11271	**0.304**
5.00	12517	1.00	12517	**0.630**
5.50	13347	1.00	13347	**0.779**

* "Elevation" is a relative elevation measured from the subdrain invert elevation.
For increased runoff analysis, rating curve starts from the bottom of basin (aboveground).
Please refer to the "Modified Rating Curve" for Increase Runoff routing analysis purpose.
The "Overall System Rating Curve" is provided just for reference purpose.

NOTE: BASED ON THE PRELIMINARY HEC-HMS ANALYSIS, THE DIFFERENCE IN THE PRE-PROJECT AND POST-PROJECT CONDITION RUNOFF HYDROGRAPH IS ANTICIPATED TO BE APPRXOIMATELY **0.62 ACRE-FEET**. AS SHOWN IN THE RATING CURVE SUMMARY TABLE ABOVE, THE PROPOSED BIORETENTION FACILITY (BASIN) ALONG WITH SUPPLEMENTAL UNDERGROUND STORAGE IS EXPECTED TO PROVIDE A VOLUME CAPACITY OF APPROXIMATELY **~0.63 ACRE-FEET** AT THE RELATIVE ELEVATION OF 5.00 FEET. ABOVE THIS ELEVATION, AN OUTLET STRUCTURE (AND A SPILLWAY) IS PROVIDED TO CONVEY OVERFLOWS. AT THIS PRELIMINARY STAGE, THIS SHOULD BE MORE THAN ADEQUATE TO ADDRESS THE 10-YEAR, 24-HOUR RUNOFF HYDROGRAPH VOLUME DIFFERENCE BETWEEN THE PRE-PROJECT AND POST-PROJECT CONDITIONS. THEREFORE, THE PROPOSED BASIN DESIGN WILL MEET THE DISTRICT'S FLOOD INCREASED RUNOFF CRITERIA.

Phelan-Seaton
JN 1916
1/20/2022

BMP 2 - SUPPORTING STAGE-STORAGE-DISCHARGE RATING CURVE SUMMARY

BMP 2: Stage-Storage-Discharge Rating Curve Summary

Proposed BMP Outletwork Detail

Basin Characteristics	
WQ ponding depth (ft) =	0.50
Mulch layer (ft) =	0.25
Bioretention soil media (ft) =	1.75
Gravel choker layer (ft) =	0.50
Gravel layer (ft) =	0.50
Dead storage (ft)	0.25

Bottom surface area (ft2) =	8,188
Grade break elevation (ft) =	3.00
Surface area @ grade break (ft2) =	8,188
Top surface area (ft2) =	13,251

Additional Storage (If applicable)	
Starting Elevation (ft)	3.00
Top Elevation (ft)	5.50
Surface area (ft2) =	9,150

Low-flow Orifice (Restrictor)	
Num. of orifices =	1
Orifice invert elevation (ft) =	0.0
Orifice diameter (in) =	6.0

BSM Filtration Rate	
BSM Expected Filtration Rate (in/hr)	5.0

Mid-flow Orifice (1st)	
Num. of orifices =	2
Orifice invert elevation (ft) =	3.5
Orifice diameter (in) =	0.5

Mid-flow Orifice (2nd)	
Num. of orifices =	1
Orifice invert elevation (ft) =	3.75
Orifice diameter (in) =	3.00

Overflow Outlet	
Outlet invert elevation (ft) =	5.50
B (ft) =	16.0

Orifice/Weir Coefficient	
Orifice coefficient, Cg =	0.60
Weir coefficient, Cs =	3.0

Overall System Rating Curve including Subsurface Layers

Stage-Discharge Summary

Elevation (ft)	Discharge (cfs)
0.00	**0.00**
1.00	**0.82**
2.75	**1.49**
3.00	**1.57**
3.50	**1.70**
3.75	**1.78**
5.50	**2.49**
6.00	**36.57**

Stage-Storage Summary

Elevation (ft)	Area (sf)	Porosity	Effective Surface Area (sf)	Storage (Cumulative) (ac-ft)
0.00	8188	0.40	3275	**0.000**
1.00	8188	0.30	2456	**0.074**
2.75	8188	0.30	2456	**0.172**
3.00	8188	1.00	8188	**0.197**
3.50	9032	1.00	9032	**0.402**
3.75	9454	1.00	9454	**0.508**
5.50	12407	1.00	12407	**1.318**
6.00	13251	1.00	13251	**1.466**

Modified Rating Curve for Riverside County Increase Runoff Mitigation Purpose (Aboveground Only)

Stage-Discharge Summary

Elevation (ft)	Discharge (cfs)
3.00	**0.00**
3.50	**0.95**
3.75	**0.95**
5.50	**1.27**
6.00	**35.25**

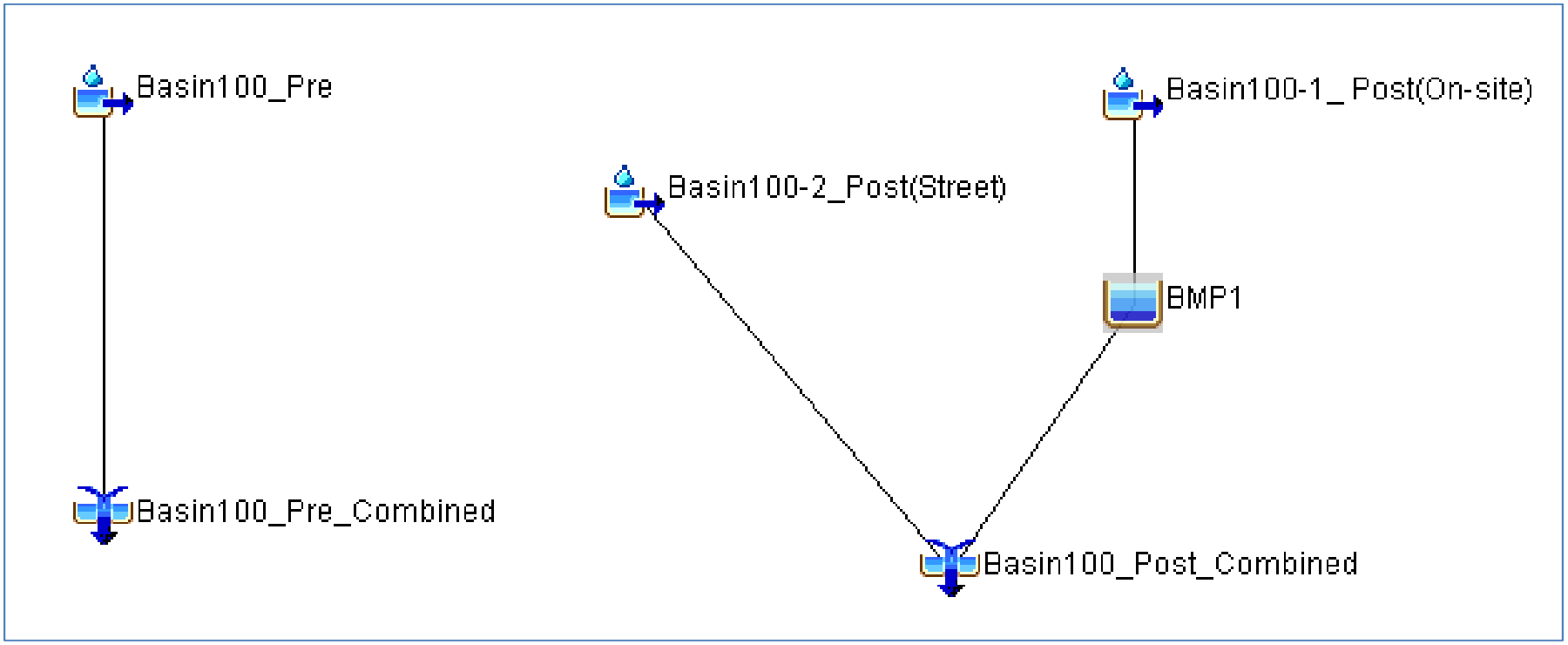
Stage-Storage Summary

Elevation (ft)	Area (sf)	Porosity	Effective Surface Area (sf)	Storage (Cumulative) (ac-ft)
3.00	8188	1.00	8188	**0.000**
3.50	9032	1.00	9032	**0.205**
3.75	9454	1.00	9454	**0.311**
5.50	12407	1.00	12407	**1.120**
6.00	13251	1.00	13251	**1.268**

* "Elevation" is a relative elevation measured from the subdrain invert elevation.
For increased runoff analysis, rating curve starts from the bottom of basin (aboveground).
Please refer to the "Modified Rating Curve" for Increase Runoff routing analysis purpose.
The "Overall System Rating Curve" is provided just for reference purpose.

NOTE: BASED ON THE PRELIMINARY HEC-HMS ANALYSIS, THE DIFFERENCE IN THE PRE-PROJECT AND POST-PROJECT CONDITION RUNOFF HYDROGRAPH IS ANTICIPATED TO BE APPRXOIMATELY **1.12 ACRE-FEET**. AS SHOWN IN THE RATING CURVE SUMMARY TABLE ABOVE, THE PROPOSED BIORETENTION FACILITY (BASIN) ALONG WITH SUPPLEMENTAL UNDERGROUND STORAGE IS EXPECTED TO PROVIDE A VOLUME CAPACITY OF APPROXIMATELY **~1.12 ACRE-FEET** AT THE RELATIVE ELEVATION OF 5.50 FEET. ABOVE THIS ELEVATION, AN OUTLET STRUCTURE IS PROVIDED TO CONVEY OVERFLOWS. AT THIS PRELIMINARY STAGE, THIS SHOULD BE MORE THAN ADEQUATE TO ADDRESS THE 10-YEAR, 24-HOUR RUNOFF HYDROGRAPH VOLUME DIFFERENCE BETWEEN THE PRE-PROJECT AND POST-PROJECT CONDITIONS. THEREFORE, THE PROPOSED BASIN DESIGN WILL MEET THE DISTRICT'S FLOOD INCREASED RUNOFF CRITERIA.

BASIN 100 – HEC-HMS – SCHEMATIC (PRE & POST)



BASIN 100 – OVERALL PEAK DISCHARGE SUMMARY (PRE & POST)

Project: PS_Basin100 Simulation Run: 10yr 24hr

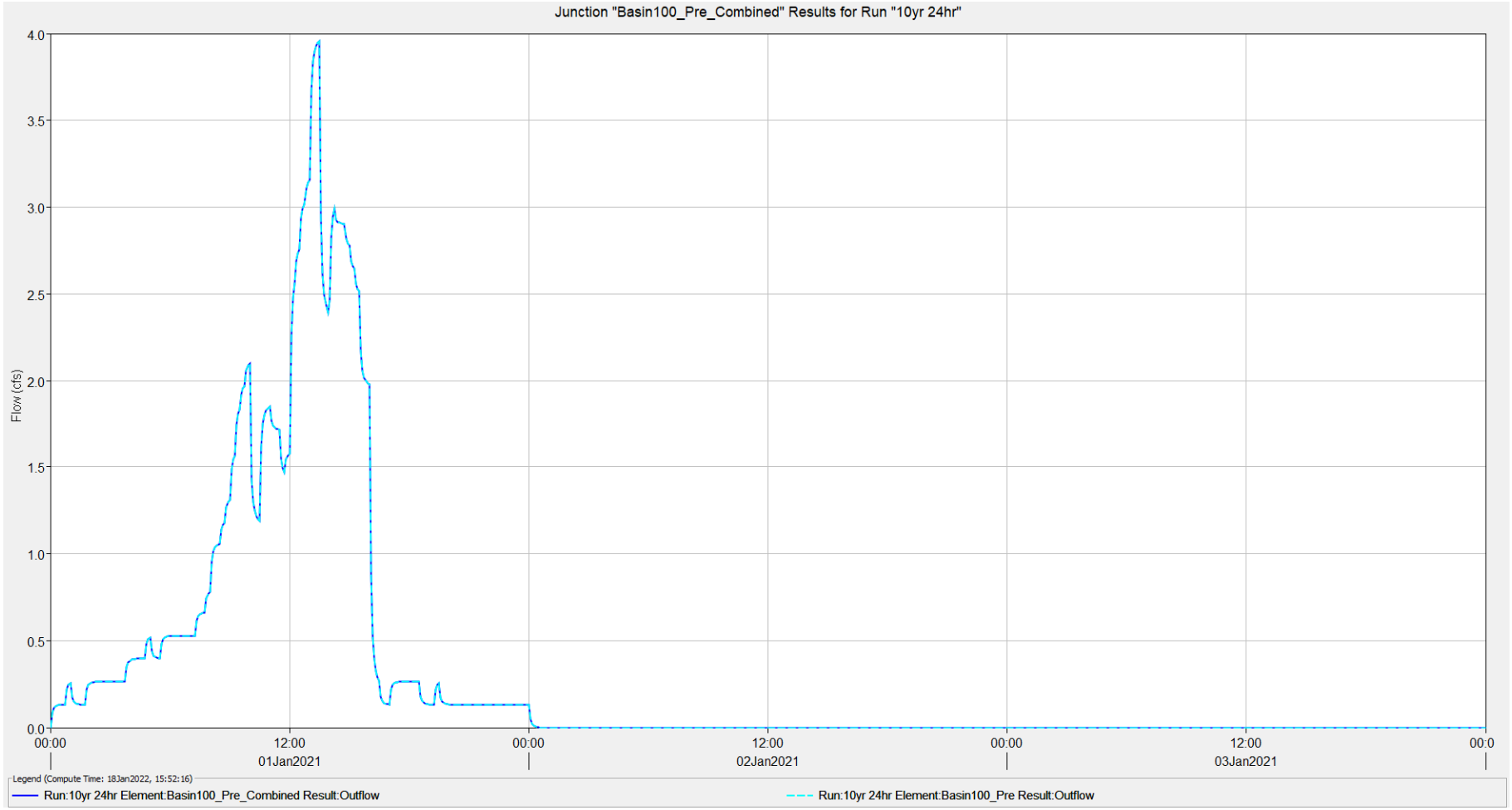
Start of Run: 01Jan2021, 00:00 Basin Model: Basin 100
End of Run: 04Jan2021, 00:00 Meteorologic Model: 10yr 24hr
Compute Time: 21Jan2022, 15:48:51 Control Specifications: 72 hours

Show Elements: All Elements Volume Units: ○ IN ◉ ACRE-FT Sorting: Hydrologic

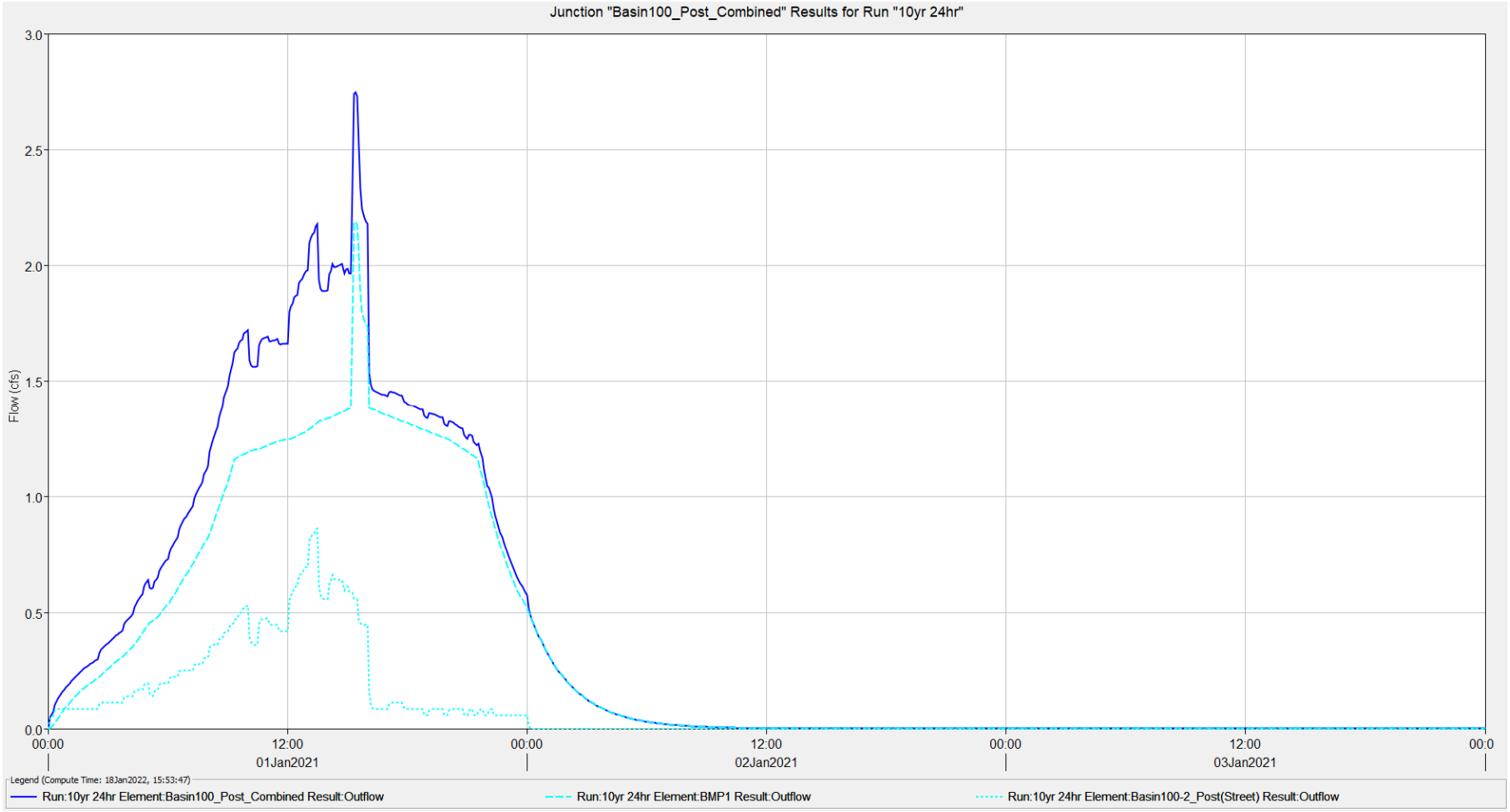
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
Basin100-1_Post(On-site)	0.01391	3.3	01Jan2021, 13:30	1.93
BMP1	0.01391	2.2	01Jan2021, 15:25	1.93
Basin100-2_Post(Street)	0.003594	0.9	01Jan2021, 13:30	0.50
Basin100_Post_Combined	0.017504	2.7	01Jan2021, 15:25	2.43
Basin100_Pre	0.01703	4.0	01Jan2021, 13:30	1.80
Basin100_Pre_Combined	0.01703	4.0	01Jan2021, 13:30	1.80

BASIN 100 - PRE VS. POST
10-YEAR, 24-HOUR HYDROGRAPH VOLUME DIFFERENCE:
2.43 - 1.80 = **0.63 ACRE-FEET**

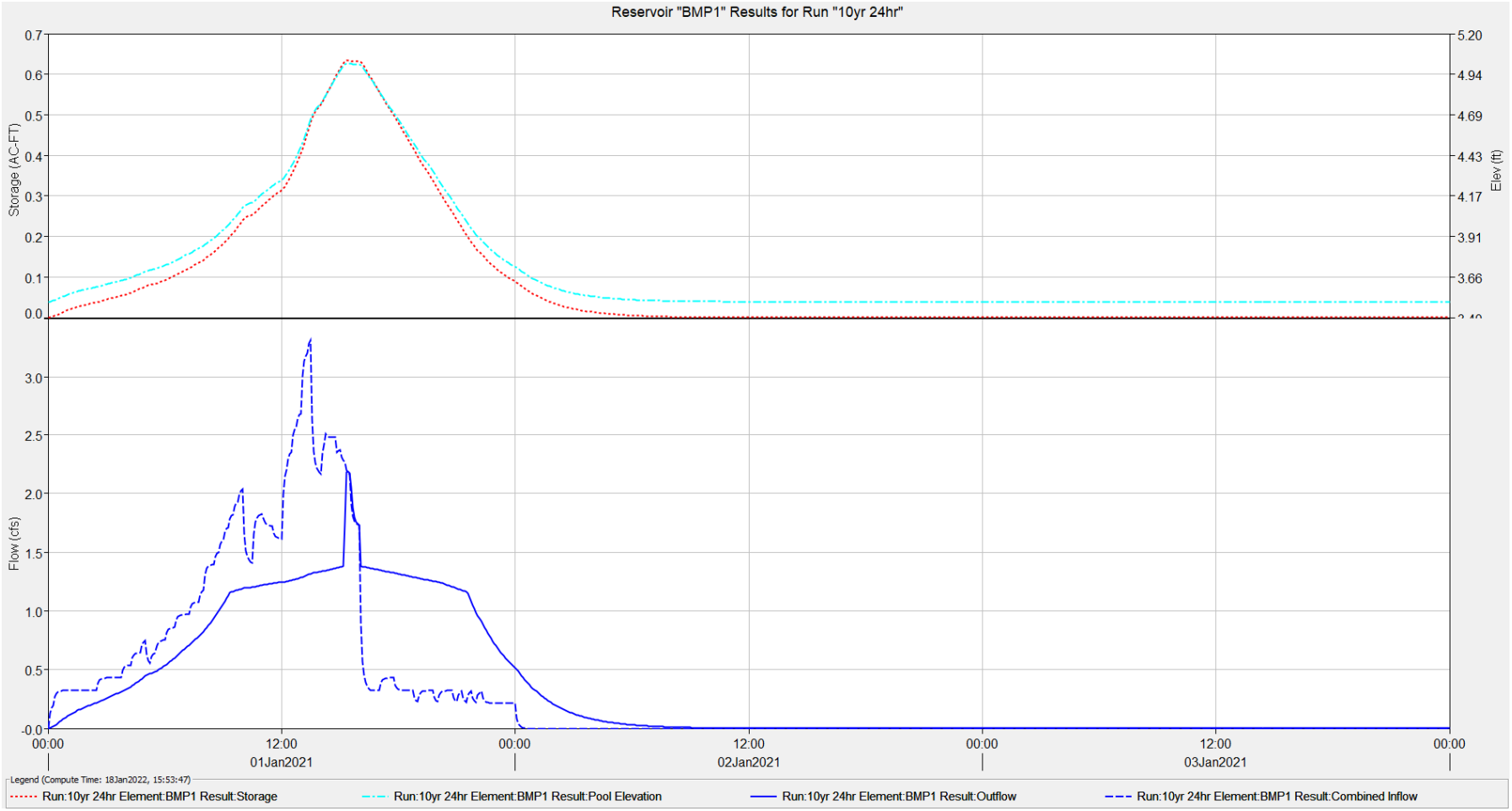
BASIN 100 – PRE-PROJECT HYDROGRAPH SUMMARY (OVERALL)



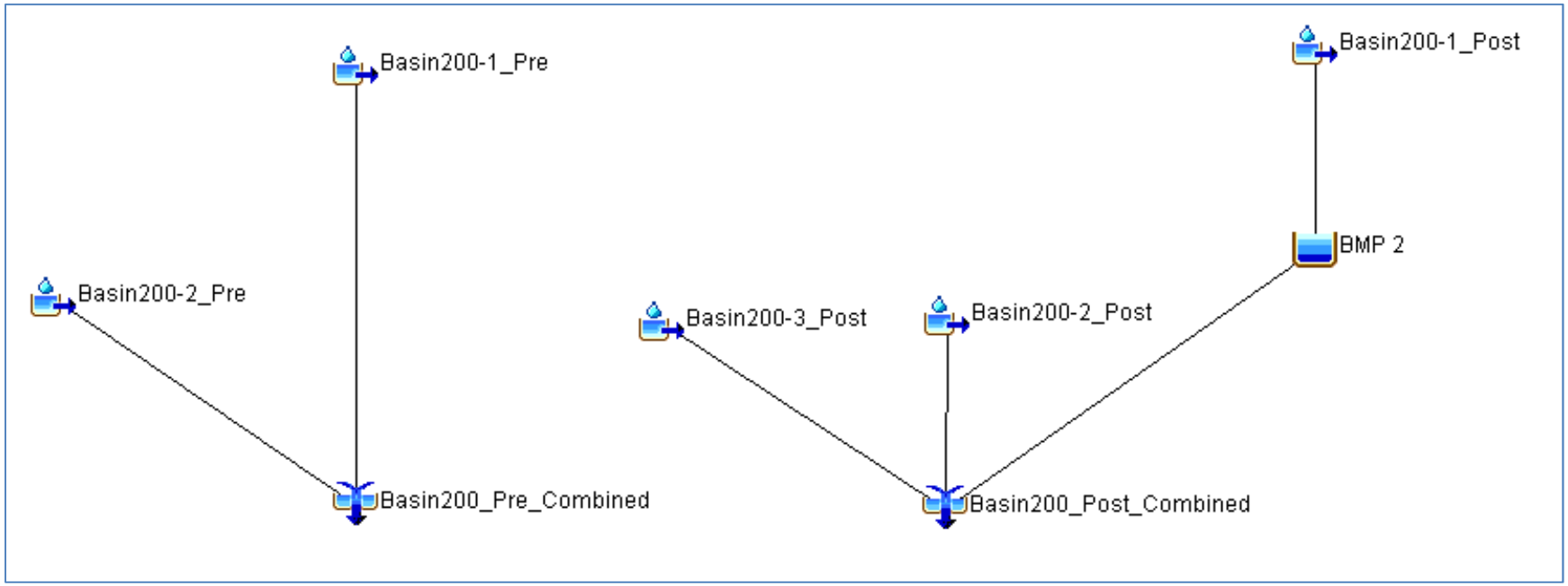
BASIN 100 – POST-PROJECT HYDROGRAPH SUMMARY (OVERALL)



BASIN 100 – POST-PROJECT HYDROGRAPH SUMMARY (BMP 1)



BASIN 200 – HEC-HMS – SCHEMATIC (PRE & POST)



BASIN 200 – OVERALL PEAK DISCHARGE SUMMARY (PRE & POST)

Project: PS_Basin200 Simulation Run: 10yr 24hr

Start of Run: 01Jan2021, 00:00
End of Run: 04Jan2021, 00:00
Compute Time: 18Jan2022, 16:00:43

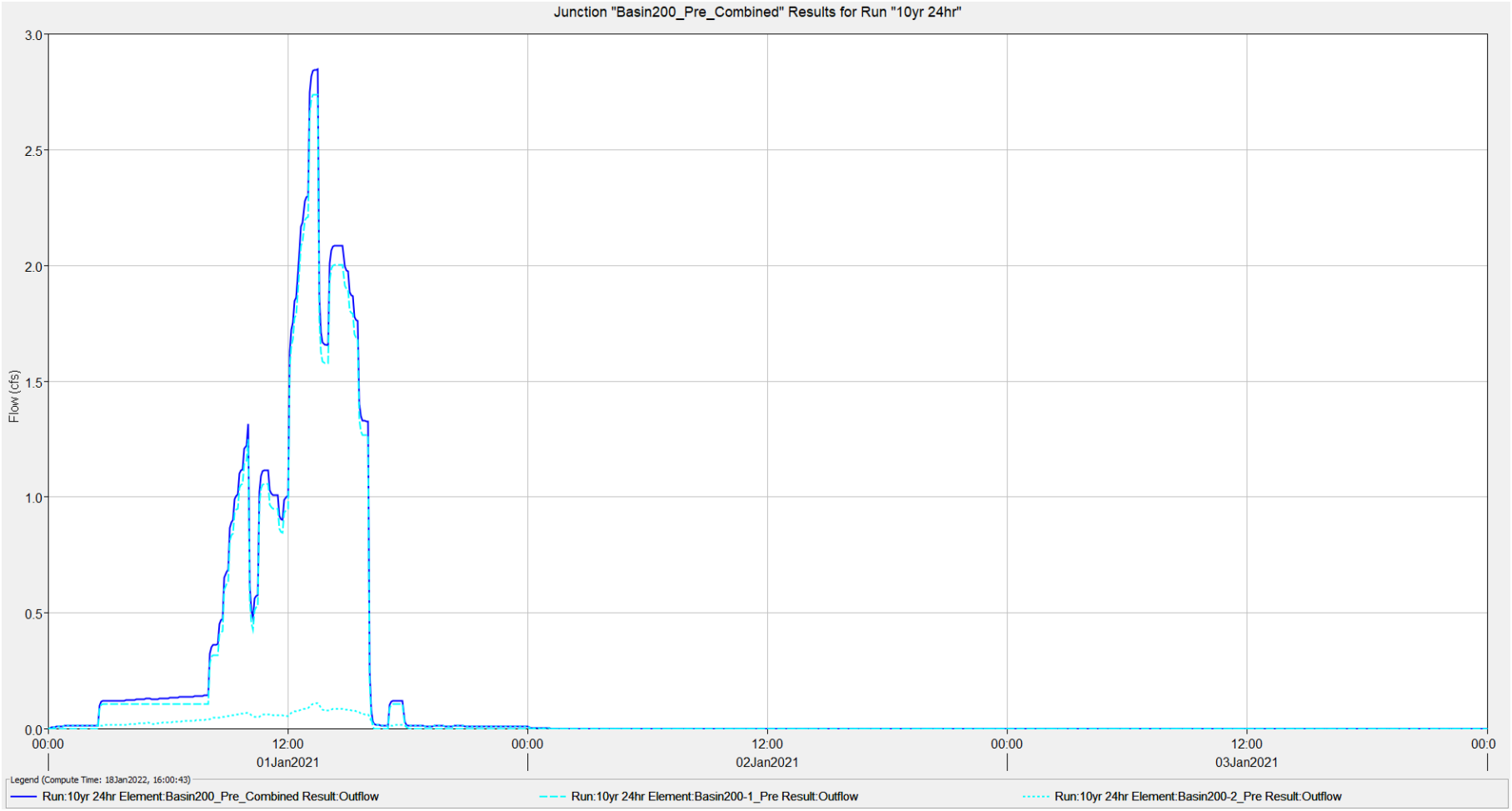
Basin Model: Basin200
Meteorologic Model: 10yr24hr
Control Specifications: 72 hours

Show Elements: All Elements | Volume Units: IN (ACRE-FT) | Sorting: Hydrologic

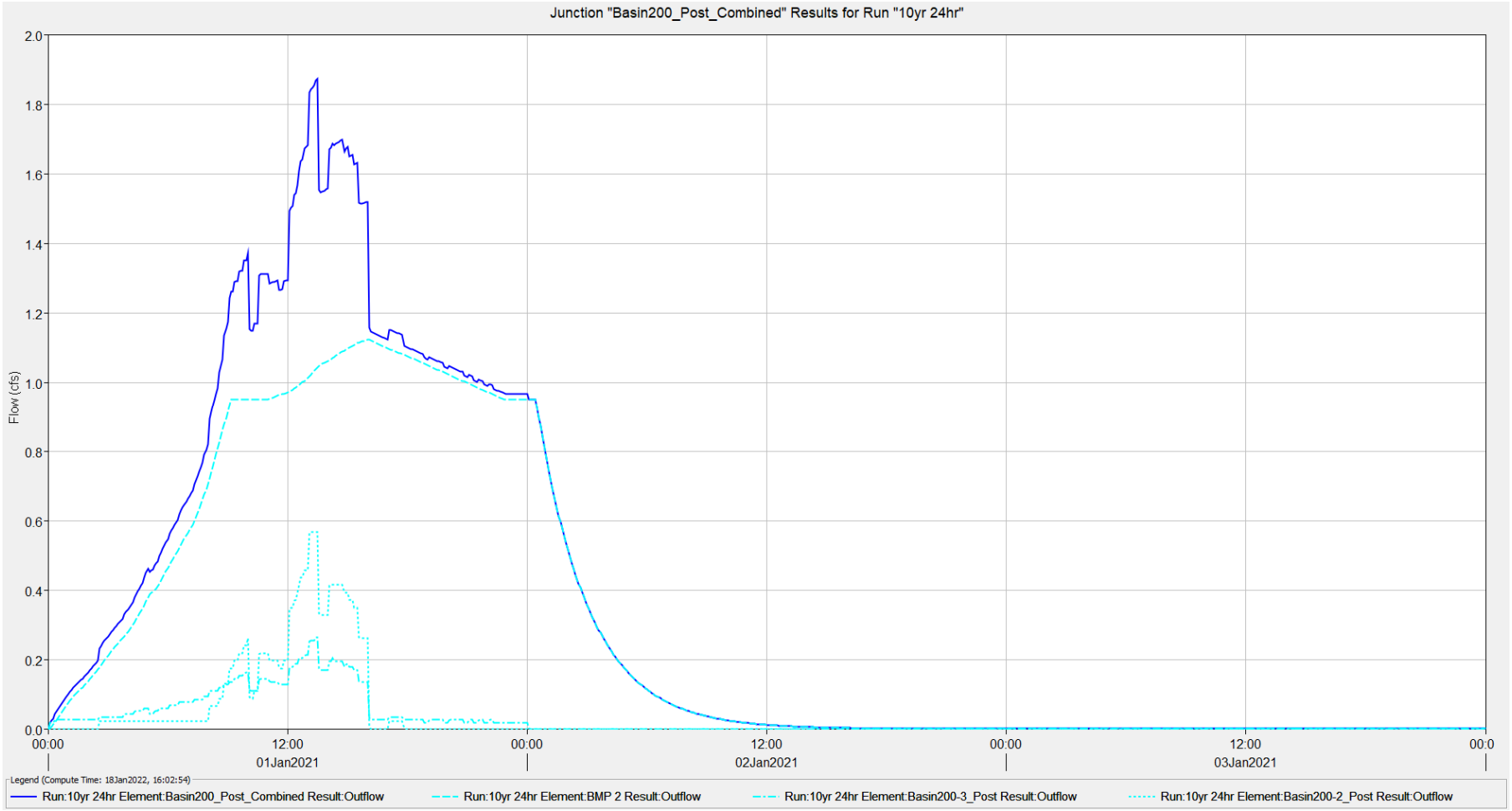
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
Basin200-1_Post	0.01063	3.0	01Jan2021, 13:20	1.77
BMP 2	0.01063	1.1	01Jan2021, 16:00	1.77
Basin200-2_Post	0.002813	0.6	01Jan2021, 13:10	0.19
Basin200-3_Post	0.001094	0.3	01Jan2021, 13:30	0.15
Basin200_Post_Combined	0.014537	1.9	01Jan2021, 13:30	2.12
Basin200-1_Pre	0.013594	2.7	01Jan2021, 13:20	0.94
Basin200-2_Pre	0.0004688	0.1	01Jan2021, 13:30	0.07
Basin200_Pre_Combined	0.0140628	2.8	01Jan2021, 13:30	1.00

BASIN 200 - PRE VS. POST
10-YEAR, 24-HOUR HYDROGRAPH VOLUME DIFFERENCE:
2.12 - 1.00 = **1.12 ACRE-FEET**

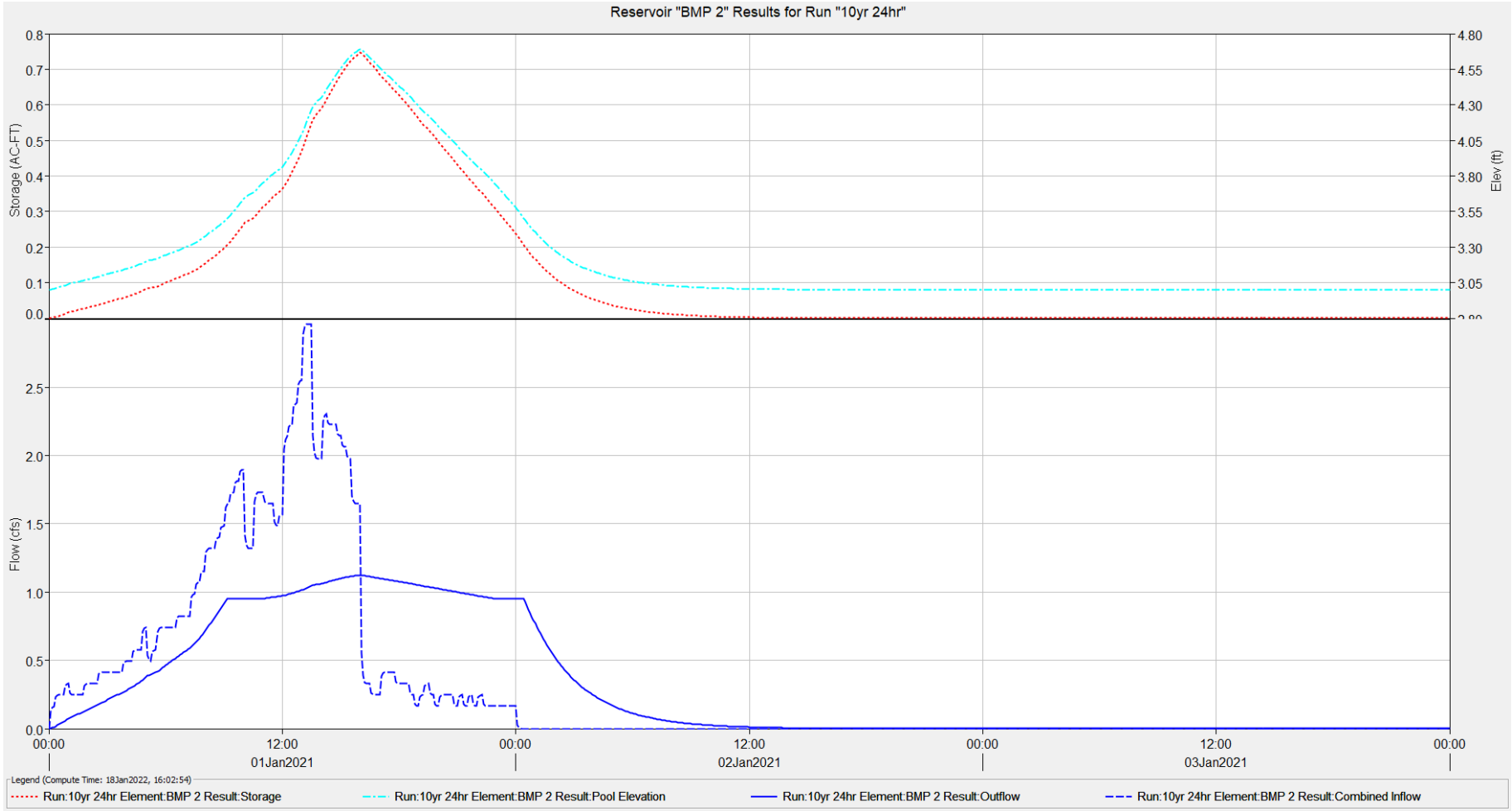
BASIN 200 – PRE-PROJECT HYDROGRAPH SUMMARY (OVERALL)



BASIN 200 – POST-PROJECT HYDROGRAPH SUMMARY (OVERALL)



BASIN 200 – POST-PROJECT HYDROGRAPH SUMMARY (BMP 2)



HMS – SUPPORTING MARTERIALS

PRE-PROCESSOR OUTPUTS

LOSS RATE & EFFECTIVE RAINFALL DATA OUTPUTS

BASIN 100 & BASIN 200

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.01703 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.02	
Length along longest watercourse - L	1237	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	844	ft
Elevation Difference	15.0	ft
Lag Time	**0.063**	**hr**
40% Lag Time	1.5	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Fallow N/A C		90	0.13000	20,000 S.F. Half Acre Lots (40)	40	0.083	11.3	1	0.083 X
						Total area =	11.3		
								Average Soil Loss =	0.083

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.01703 sq mi

1 Hour Storm		3 Hour Storm		6 Hour Storm		24 Hour Storm	
Point Precipitation	in.	Point Precipitation	in.	Point Precipitation	in.	Point Precipitation	3.15 in.
Areal Adjustment Factor	%	Areal Adjustment Factor	%	Areal Adjustment Factor	%	Areal Adjustment Factor	100 %
Adjusted Point Precipitation		Adjusted Point Precipitation		Adjusted Point Precipitation		Adjusted Point Precipitation	3.15
Slope of Rainfall Intensity - Duration Curve							

Lag Time Calculator

Basin Factor - n	0.020	
Length along longest watercourse - L	1237	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	844	ft
Elevation Difference	15.0	ft
Lag Time	**0.063**	**hr**
40% Lag Time	1.5	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 58 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour		3 Hour		6 Hour		24 Hour	
Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)
						00:05	0.001
						00:10	0.001
						00:15	0.001
						00:20	0.001
						00:25	0.001
						00:30	0.001
						00:35	0.001

00:40	0.001
00:45	0.001
00:50	0.002
00:55	0.002
01:00	0.002
01:05	0.001
01:10	0.001
01:15	0.001
01:20	0.001
01:25	0.001
01:30	0.001
01:35	0.001
01:40	0.001
01:45	0.001
01:50	0.002
01:55	0.002
02:00	0.002
02:05	0.002
02:10	0.002
02:15	0.002
02:20	0.002
02:25	0.002
02:30	0.002
02:35	0.002
02:40	0.002
02:45	0.002
02:50	0.002
02:55	0.002
03:00	0.002
03:05	0.002
03:10	0.002
03:15	0.002
03:20	0.002
03:25	0.002
03:30	0.002
03:35	0.002
03:40	0.002
03:45	0.002
03:50	0.003
03:55	0.003
04:00	0.003
04:05	0.003
04:10	0.003
04:15	0.003
04:20	0.003
04:25	0.003
04:30	0.003
04:35	0.003
04:40	0.003
04:45	0.003
04:50	0.004
04:55	0.004
05:00	0.004
05:05	0.003
05:10	0.003

05:15	0.003
05:20	0.003
05:25	0.003
05:30	0.003
05:35	0.004
05:40	0.004
05:45	0.004
05:50	0.004
05:55	0.004
06:00	0.004
06:05	0.004
06:10	0.004
06:15	0.004
06:20	0.004
06:25	0.004
06:30	0.004
06:35	0.004
06:40	0.004
06:45	0.004
06:50	0.004
06:55	0.004
07:00	0.004
07:05	0.004
07:10	0.004
07:15	0.004
07:20	0.005
07:25	0.005
07:30	0.005
07:35	0.005
07:40	0.005
07:45	0.005
07:50	0.006
07:55	0.006
08:00	0.006
08:05	0.008
08:10	0.008
08:15	0.008
08:20	0.008
08:25	0.008
08:30	0.008
08:35	0.009
08:40	0.009
08:45	0.009
08:50	0.01
08:55	0.01
09:00	0.01
09:05	0.012
09:10	0.012
09:15	0.012
09:20	0.014
09:25	0.014
09:30	0.014
09:35	0.015
09:40	0.015
09:45	0.015

09:50	0.016
09:55	0.016
10:00	0.016
10:05	0.008
10:10	0.009
10:15	0.009
10:20	0.009
10:25	0.009
10:30	0.009
10:35	0.014
10:40	0.014
10:45	0.014
10:50	0.014
10:55	0.014
11:00	0.014
11:05	0.013
11:10	0.013
11:15	0.013
11:20	0.013
11:25	0.013
11:30	0.013
11:35	0.011
11:40	0.011
11:45	0.011
11:50	0.012
11:55	0.012
12:00	0.012
12:05	0.02
12:10	0.02
12:15	0.02
12:20	0.021
12:25	0.021
12:30	0.021
12:35	0.023
12:40	0.023
12:45	0.023
12:50	0.024
12:55	0.024
13:00	0.024
13:05	0.03
13:10	0.03
13:15	0.03
13:20	0.03
13:25	0.03
13:30	0.03
13:35	0.018
13:40	0.018
13:45	0.018
13:50	0.018
13:55	0.018
14:00	0.019
14:05	0.023
14:10	0.023
14:15	0.023
14:20	0.022

14:25	0.022
14:30	0.022
14:35	0.022
14:40	0.022
14:45	0.022
14:50	0.021
14:55	0.021
15:00	0.021
15:05	0.02
15:10	0.02
15:15	0.02
15:20	0.019
15:25	0.019
15:30	0.019
15:35	0.015
15:40	0.015
15:45	0.015
15:50	0.015
15:55	0.015
16:00	0.015
16:05	0.002
16:10	0.002
16:15	0.002
16:20	0.002
16:25	0.002
16:30	0.002
16:35	0.001
16:40	0.001
16:45	0.001
16:50	0.001
16:55	0.001
17:00	0.001
17:05	0.002
17:10	0.002
17:15	0.002
17:20	0.002
17:25	0.002
17:30	0.002
17:35	0.002
17:40	0.002
17:45	0.002
17:50	0.002
17:55	0.002
18:00	0.002
18:05	0.002
18:10	0.002
18:15	0.002
18:20	0.002
18:25	0.002
18:30	0.002
18:35	0.001
18:40	0.001
18:45	0.001
18:50	0.001
18:55	0.001

19:00	0.001
19:05	0.001
19:10	0.001
19:15	0.001
19:20	0.002
19:25	0.002
19:30	0.002
19:35	0.001
19:40	0.001
19:45	0.001
19:50	0.001
19:55	0.001
20:00	0.001
20:05	0.001
20:10	0.001
20:15	0.001
20:20	0.001
20:25	0.001
20:30	0.001
20:35	0.001
20:40	0.001
20:45	0.001
20:50	0.001
20:55	0.001
21:00	0.001
21:05	0.001
21:10	0.001
21:15	0.001
21:20	0.001
21:25	0.001
21:30	0.001
21:35	0.001
21:40	0.001
21:45	0.001
21:50	0.001
21:55	0.001
22:00	0.001
22:05	0.001
22:10	0.001
22:15	0.001
22:20	0.001
22:25	0.001
22:30	0.001
22:35	0.001
22:40	0.001
22:45	0.001
22:50	0.001
22:55	0.001
23:00	0.001
23:05	0.001
23:10	0.001
23:15	0.001
23:20	0.001
23:25	0.001
23:30	0.001

			23:35	0.001
			23:40	0.001
			23:45	0.001
			23:50	0.001
			23:55	0.001
			00:00	0.001

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.01391 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	1774	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	1239	ft
Elevation Difference	11	ft
Lag Time	**0.071**	**hr**
40% Lag Time	1.7	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Urban Landscaping Good C		69	0.37300	Commercial, Downtown Business or Industrial (90)	90	0.071	8.9	1	0.071 X
						Total area =	8.9		
								Average Soil Loss =	0.071

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.01391 sq mi

1 Hour Storm		3 Hour Storm		6 Hour Storm		24 Hour Storm	
Point Precipitation	in.	Point Precipitation	in.	Point Precipitation	in.	Point Precipitation	3.15 in.
Areal Adjustment Factor	%	Areal Adjustment Factor	%	Areal Adjustment Factor	%	Areal Adjustment Factor	100 %
Adjusted Point Precipitation		Adjusted Point Precipitation		Adjusted Point Precipitation		Adjusted Point Precipitation	3.15
Slope of Rainfall Intensity - Duration Curve							

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	1774	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	1239	ft
Elevation Difference	11	ft
Lag Time	**0.071**	**hr**
40% Lag Time	1.7	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 18 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour		3 Hour		6 Hour		24 Hour	
Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)
						00:05	0.002
						00:10	0.002
						00:15	0.002
						00:20	0.003
						00:25	0.003
						00:30	0.003
						00:35	0.003

00:40	0.003
00:45	0.003
00:50	0.003
00:55	0.003
01:00	0.003
01:05	0.003
01:10	0.003
01:15	0.003
01:20	0.003
01:25	0.003
01:30	0.003
01:35	0.003
01:40	0.003
01:45	0.003
01:50	0.003
01:55	0.003
02:00	0.003
02:05	0.003
02:10	0.003
02:15	0.003
02:20	0.003
02:25	0.003
02:30	0.003
02:35	0.004
02:40	0.004
02:45	0.004
02:50	0.004
02:55	0.004
03:00	0.004
03:05	0.004
03:10	0.004
03:15	0.004
03:20	0.004
03:25	0.004
03:30	0.004
03:35	0.004
03:40	0.004
03:45	0.004
03:50	0.005
03:55	0.005
04:00	0.005
04:05	0.005
04:10	0.005
04:15	0.005
04:20	0.006
04:25	0.006
04:30	0.006
04:35	0.006
04:40	0.006
04:45	0.006
04:50	0.007
04:55	0.007
05:00	0.007
05:05	0.005
05:10	0.005

05:15	0.005
05:20	0.006
05:25	0.006
05:30	0.006
05:35	0.007
05:40	0.007
05:45	0.007
05:50	0.007
05:55	0.007
06:00	0.007
06:05	0.008
06:10	0.008
06:15	0.008
06:20	0.008
06:25	0.008
06:30	0.008
06:35	0.009
06:40	0.009
06:45	0.009
06:50	0.009
06:55	0.009
07:00	0.009
07:05	0.009
07:10	0.009
07:15	0.009
07:20	0.01
07:25	0.01
07:30	0.01
07:35	0.01
07:40	0.01
07:45	0.01
07:50	0.011
07:55	0.011
08:00	0.011
08:05	0.013
08:10	0.013
08:15	0.013
08:20	0.013
08:25	0.013
08:30	0.013
08:35	0.014
08:40	0.014
08:45	0.014
08:50	0.015
08:55	0.015
09:00	0.015
09:05	0.016
09:10	0.016
09:15	0.016
09:20	0.017
09:25	0.017
09:30	0.017
09:35	0.018
09:40	0.018
09:45	0.018

09:50	0.019
09:55	0.019
10:00	0.019
10:05	0.013
10:10	0.013
10:15	0.013
10:20	0.013
10:25	0.013
10:30	0.013
10:35	0.017
10:40	0.017
10:45	0.017
10:50	0.017
10:55	0.017
11:00	0.017
11:05	0.016
11:10	0.016
11:15	0.016
11:20	0.016
11:25	0.016
11:30	0.016
11:35	0.015
11:40	0.015
11:45	0.015
11:50	0.015
11:55	0.015
12:00	0.015
12:05	0.021
12:10	0.021
12:15	0.021
12:20	0.022
12:25	0.022
12:30	0.022
12:35	0.024
12:40	0.024
12:45	0.024
12:50	0.025
12:55	0.025
13:00	0.025
13:05	0.03
13:10	0.03
13:15	0.03
13:20	0.03
13:25	0.031
13:30	0.031
13:35	0.02
13:40	0.02
13:45	0.02
13:50	0.02
13:55	0.02
14:00	0.02
14:05	0.023
14:10	0.023
14:15	0.024
14:20	0.023

14:25	0.023
14:30	0.023
14:35	0.023
14:40	0.023
14:45	0.023
14:50	0.021
14:55	0.022
15:00	0.022
15:05	0.021
15:10	0.021
15:15	0.021
15:20	0.02
15:25	0.02
15:30	0.02
15:35	0.016
15:40	0.016
15:45	0.016
15:50	0.016
15:55	0.016
16:00	0.016
16:05	0.003
16:10	0.003
16:15	0.003
16:20	0.003
16:25	0.003
16:30	0.003
16:35	0.003
16:40	0.003
16:45	0.003
16:50	0.003
16:55	0.003
17:00	0.003
17:05	0.004
17:10	0.004
17:15	0.004
17:20	0.004
17:25	0.004
17:30	0.004
17:35	0.004
17:40	0.004
17:45	0.004
17:50	0.003
17:55	0.003
18:00	0.003
18:05	0.003
18:10	0.003
18:15	0.003
18:20	0.003
18:25	0.003
18:30	0.003
18:35	0.003
18:40	0.003
18:45	0.003
18:50	0.002
18:55	0.002

19:00	0.002
19:05	0.003
19:10	0.003
19:15	0.003
19:20	0.003
19:25	0.003
19:30	0.003
19:35	0.003
19:40	0.003
19:45	0.003
19:50	0.002
19:55	0.002
20:00	0.002
20:05	0.003
20:10	0.003
20:15	0.003
20:20	0.003
20:25	0.003
20:30	0.003
20:35	0.003
20:40	0.003
20:45	0.003
20:50	0.002
20:55	0.002
21:00	0.002
21:05	0.003
21:10	0.003
21:15	0.003
21:20	0.002
21:25	0.002
21:30	0.002
21:35	0.003
21:40	0.003
21:45	0.003
21:50	0.002
21:55	0.002
22:00	0.002
22:05	0.003
22:10	0.003
22:15	0.003
22:20	0.002
22:25	0.002
22:30	0.002
22:35	0.002
22:40	0.002
22:45	0.002
22:50	0.002
22:55	0.002
23:00	0.002
23:05	0.002
23:10	0.002
23:15	0.002
23:20	0.002
23:25	0.002
23:30	0.002

			23:35	0.002
			23:40	0.002
			23:45	0.002
			23:50	0.002
			23:55	0.002
			00:00	0.002

User Manual
Contact Project Planning **(951) 955-1200**

HEC HMS Preprocessor

Watershed Area 0.003594 sq mi

1 Hour Storm	*3 Hour Storm*	*6 Hour Storm*	*24 Hour Storm*
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	1272	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	444	ft
Elevation Difference	13	ft
Lag Time	**0.038**	**hr**
40% Lag Time	0.9	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Urban Landscaping Good C		69	0.37300	Commercial, Downtown Business or Industrial (90)	90	0.071	2.3	1	0.071 X
						Total area =	2.3		
								Average Soil Loss =	0.071

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.003594 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	1272	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	444	ft
Elevation Difference	13	ft
Lag Time	**0.038**	**hr**
40% Lag Time	0.9	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 18 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour		3 Hour		6 Hour		24 Hour	
Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)
						00:05	0.002
						00:10	0.002
						00:15	0.002
						00:20	0.003
						00:25	0.003
						00:30	0.003
						00:35	0.003

00:40	0.003
00:45	0.003
00:50	0.003
00:55	0.003
01:00	0.003
01:05	0.003
01:10	0.003
01:15	0.003
01:20	0.003
01:25	0.003
01:30	0.003
01:35	0.003
01:40	0.003
01:45	0.003
01:50	0.003
01:55	0.003
02:00	0.003
02:05	0.003
02:10	0.003
02:15	0.003
02:20	0.003
02:25	0.003
02:30	0.003
02:35	0.004
02:40	0.004
02:45	0.004
02:50	0.004
02:55	0.004
03:00	0.004
03:05	0.004
03:10	0.004
03:15	0.004
03:20	0.004
03:25	0.004
03:30	0.004
03:35	0.004
03:40	0.004
03:45	0.004
03:50	0.005
03:55	0.005
04:00	0.005
04:05	0.005
04:10	0.005
04:15	0.005
04:20	0.006
04:25	0.006
04:30	0.006
04:35	0.006
04:40	0.006
04:45	0.006
04:50	0.007
04:55	0.007
05:00	0.007
05:05	0.005
05:10	0.005

05:15	0.005
05:20	0.006
05:25	0.006
05:30	0.006
05:35	0.007
05:40	0.007
05:45	0.007
05:50	0.007
05:55	0.007
06:00	0.007
06:05	0.008
06:10	0.008
06:15	0.008
06:20	0.008
06:25	0.008
06:30	0.008
06:35	0.009
06:40	0.009
06:45	0.009
06:50	0.009
06:55	0.009
07:00	0.009
07:05	0.009
07:10	0.009
07:15	0.009
07:20	0.01
07:25	0.01
07:30	0.01
07:35	0.01
07:40	0.01
07:45	0.01
07:50	0.011
07:55	0.011
08:00	0.011
08:05	0.013
08:10	0.013
08:15	0.013
08:20	0.013
08:25	0.013
08:30	0.013
08:35	0.014
08:40	0.014
08:45	0.014
08:50	0.015
08:55	0.015
09:00	0.015
09:05	0.016
09:10	0.016
09:15	0.016
09:20	0.017
09:25	0.017
09:30	0.017
09:35	0.018
09:40	0.018
09:45	0.018

09:50	0.019
09:55	0.019
10:00	0.019
10:05	0.013
10:10	0.013
10:15	0.013
10:20	0.013
10:25	0.013
10:30	0.013
10:35	0.017
10:40	0.017
10:45	0.017
10:50	0.017
10:55	0.017
11:00	0.017
11:05	0.016
11:10	0.016
11:15	0.016
11:20	0.016
11:25	0.016
11:30	0.016
11:35	0.015
11:40	0.015
11:45	0.015
11:50	0.015
11:55	0.015
12:00	0.015
12:05	0.021
12:10	0.021
12:15	0.021
12:20	0.022
12:25	0.022
12:30	0.022
12:35	0.024
12:40	0.024
12:45	0.024
12:50	0.025
12:55	0.025
13:00	0.025
13:05	0.03
13:10	0.03
13:15	0.03
13:20	0.03
13:25	0.031
13:30	0.031
13:35	0.02
13:40	0.02
13:45	0.02
13:50	0.02
13:55	0.02
14:00	0.02
14:05	0.023
14:10	0.023
14:15	0.024
14:20	0.023

14:25	0.023
14:30	0.023
14:35	0.023
14:40	0.023
14:45	0.023
14:50	0.021
14:55	0.022
15:00	0.022
15:05	0.021
15:10	0.021
15:15	0.021
15:20	0.02
15:25	0.02
15:30	0.02
15:35	0.016
15:40	0.016
15:45	0.016
15:50	0.016
15:55	0.016
16:00	0.016
16:05	0.003
16:10	0.003
16:15	0.003
16:20	0.003
16:25	0.003
16:30	0.003
16:35	0.003
16:40	0.003
16:45	0.003
16:50	0.003
16:55	0.003
17:00	0.003
17:05	0.004
17:10	0.004
17:15	0.004
17:20	0.004
17:25	0.004
17:30	0.004
17:35	0.004
17:40	0.004
17:45	0.004
17:50	0.003
17:55	0.003
18:00	0.003
18:05	0.003
18:10	0.003
18:15	0.003
18:20	0.003
18:25	0.003
18:30	0.003
18:35	0.003
18:40	0.003
18:45	0.003
18:50	0.002
18:55	0.002

19:00	0.002
19:05	0.003
19:10	0.003
19:15	0.003
19:20	0.003
19:25	0.003
19:30	0.003
19:35	0.003
19:40	0.003
19:45	0.003
19:50	0.002
19:55	0.002
20:00	0.002
20:05	0.003
20:10	0.003
20:15	0.003
20:20	0.003
20:25	0.003
20:30	0.003
20:35	0.003
20:40	0.003
20:45	0.003
20:50	0.002
20:55	0.002
21:00	0.002
21:05	0.003
21:10	0.003
21:15	0.003
21:20	0.002
21:25	0.002
21:30	0.002
21:35	0.003
21:40	0.003
21:45	0.003
21:50	0.002
21:55	0.002
22:00	0.002
22:05	0.003
22:10	0.003
22:15	0.003
22:20	0.002
22:25	0.002
22:30	0.002
22:35	0.002
22:40	0.002
22:45	0.002
22:50	0.002
22:55	0.002
23:00	0.002
23:05	0.002
23:10	0.002
23:15	0.002
23:20	0.002
23:25	0.002
23:30	0.002

			23:35	0.002
			23:40	0.002
			23:45	0.002
			23:50	0.002
			23:55	0.002
			00:00	0.002

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.013594 sq mi

1 Hour Storm	*3 Hour Storm*	*6 Hour Storm*	*24 Hour Storm*
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.020	
Length along longest watercourse - L	827	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	356	ft
Elevation Difference	23.0	ft
Lag Time	**0.033**	**hr**
40% Lag Time	0.8	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Fallow N/A C		90	0.13000	Natural or Agriculture (0)	0	0.13	8.7	1	0.13 X
						Total area =	8.7		
								Average Soil Loss =	0.13

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.013594 sq mi

1 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation
Slope of Rainfall Intensity - Duration Curve

3 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation

6 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation

24 Hour Storm

Point Precipitation 3.15 in.
Areal Adj
Refer to Plate E-5.8

Lag Time Calculator

Basin Factor - n	0.020	
Length along longest watercourse - L	827	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	356	ft
Elevation Difference	23.0	ft
Lag Time	**0.033**	**hr**
40% Lag Time	0.8	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 90 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour

Unit Time	Effective Rainfall (inches)

3 Hour

Unit Time	Effective Rainfall (inches)

6 Hour

Unit Time	Effective Rainfall (inches)

24 Hour

Unit Time	Effective Rainfall (inches)
00:05	0
00:10	0
00:15	0
00:20	0
00:25	0
00:30	0
00:35	0
00:40	0
00:45	0
00:50	0
00:55	0
01:00	0
01:05	0
01:10	0
01:15	0
01:20	0
01:25	0
01:30	0
01:35	0
01:40	0
01:45	0
01:50	0
01:55	0
02:00	0
02:05	0
02:10	0
02:15	0
02:20	0
02:25	0
02:30	0
02:35	0.001
02:40	0.001

02:45	0.001
02:50	0.001
02:55	0.001
03:00	0.001
03:05	0.001
03:10	0.001
03:15	0.001
03:20	0.001
03:25	0.001
03:30	0.001
03:35	0.001
03:40	0.001
03:45	0.001
03:50	0.001
03:55	0.001
04:00	0.001
04:05	0.001
04:10	0.001
04:15	0.001
04:20	0.001
04:25	0.001
04:30	0.001
04:35	0.001
04:40	0.001
04:45	0.001
04:50	0.001
04:55	0.001
05:00	0.001
05:05	0.001
05:10	0.001
05:15	0.001
05:20	0.001
05:25	0.001
05:30	0.001
05:35	0.001
05:40	0.001
05:45	0.001
05:50	0.001
05:55	0.001
06:00	0.001
06:05	0.001
06:10	0.001
06:15	0.001
06:20	0.001
06:25	0.001
06:30	0.001
06:35	0.001
06:40	0.001
06:45	0.001
06:50	0.001
06:55	0.001
07:00	0.001
07:05	0.001
07:10	0.001
07:15	0.001
07:20	0.001
07:25	0.001
07:30	0.001
07:35	0.001
07:40	0.001
07:45	0.001
07:50	0.001
07:55	0.001
08:00	0.001
08:05	0.003
08:10	0.003
08:15	0.003
08:20	0.003
08:25	0.003
08:30	0.003
08:35	0.004
08:40	0.004
08:45	0.004
08:50	0.006
08:55	0.006
09:00	0.006

09:05	0.008
09:10	0.008
09:15	0.008
09:20	0.009
09:25	0.009
09:30	0.009
09:35	0.01
09:40	0.01
09:45	0.01
09:50	0.011
09:55	0.011
10:00	0.012
10:05	0.004
10:10	0.004
10:15	0.004
10:20	0.005
10:25	0.005
10:30	0.005
10:35	0.01
10:40	0.01
10:45	0.01
10:50	0.01
10:55	0.01
11:00	0.01
11:05	0.009
11:10	0.009
11:15	0.009
11:20	0.009
11:25	0.009
11:30	0.009
11:35	0.008
11:40	0.008
11:45	0.008
11:50	0.009
11:55	0.009
12:00	0.009
12:05	0.016
12:10	0.016
12:15	0.016
12:20	0.017
12:25	0.017
12:30	0.018
12:35	0.019
12:40	0.02
12:45	0.02
12:50	0.021
12:55	0.021
13:00	0.021
13:05	0.026
13:10	0.026
13:15	0.026
13:20	0.026
13:25	0.026
13:30	0.026
13:35	0.015
13:40	0.015
13:45	0.015
13:50	0.015
13:55	0.015
14:00	0.015
14:05	0.019
14:10	0.019
14:15	0.019
14:20	0.019
14:25	0.019
14:30	0.019
14:35	0.019
14:40	0.019
14:45	0.019
14:50	0.018
14:55	0.018
15:00	0.018
15:05	0.017
15:10	0.017
15:15	0.017
15:20	0.016

15:25	0.016
15:30	0.016
15:35	0.012
15:40	0.012
15:45	0.012
15:50	0.012
15:55	0.012
16:00	0.012
16:05	0
16:10	0
16:15	0
16:20	0
16:25	0
16:30	0
16:35	0
16:40	0
16:45	0
16:50	0
16:55	0
17:00	0
17:05	0.001
17:10	0.001
17:15	0.001
17:20	0.001
17:25	0.001
17:30	0.001
17:35	0.001
17:40	0.001
17:45	0.001
17:50	0
17:55	0
18:00	0
18:05	0
18:10	0
18:15	0
18:20	0
18:25	0
18:30	0
18:35	0
18:40	0
18:45	0
18:50	0
18:55	0
19:00	0
19:05	0
19:10	0
19:15	0
19:20	0
19:25	0
19:30	0
19:35	0
19:40	0
19:45	0
19:50	0
19:55	0
20:00	0
20:05	0
20:10	0
20:15	0
20:20	0
20:25	0
20:30	0
20:35	0
20:40	0
20:45	0
20:50	0
20:55	0
21:00	0
21:05	0
21:10	0
21:15	0
21:20	0
21:25	0
21:30	0
21:35	0
21:40	0

21:45	0
21:50	0
21:55	0
22:00	0
22:05	0
22:10	0
22:15	0
22:20	0
22:25	0
22:30	0
22:35	0
22:40	0
22:45	0
22:50	0
22:55	0
23:00	0
23:05	0
23:10	0
23:15	0
23:20	0
23:25	0
23:30	0
23:35	0
23:40	0
23:45	0
23:50	0
23:55	0
00:00	0

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.0004688 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.15	
Length along longest watercourse - L	488	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	78	ft
Elevation Difference	4.6	ft
Lag Time	**0.14**	**hr**
40% Lag Time	3.4	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Urban Landscaping Good C		69	0.37300	Commercial, Downtown Business or Industrial (90)	90	0.071	0.3	1	0.071 X
						Total area =	0.3		
								Average Soil Loss =	0.071

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.0004688 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.15	
Length along longest watercourse - L	488	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	78	ft
Elevation Difference	4.6	ft
Lag Time	**0.14**	**hr**
40% Lag Time	3.4	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 18 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour

Unit Time	Effective Rainfall (inches)

3 Hour

Unit Time	Effective Rainfall (inches)

6 Hour

Unit Time	Effective Rainfall (inches)

24 Hour

Unit Time	Effective Rainfall (inches)
00:05	0.002
00:10	0.002
00:15	0.002
00:20	0.003
00:25	0.003
00:30	0.003
00:35	0.003
00:40	0.003
00:45	0.003
00:50	0.003
00:55	0.003
01:00	0.003
01:05	0.003
01:10	0.003
01:15	0.003
01:20	0.003
01:25	0.003
01:30	0.003
01:35	0.003
01:40	0.003
01:45	0.003
01:50	0.003
01:55	0.003
02:00	0.003
02:05	0.003
02:10	0.003
02:15	0.003
02:20	0.003
02:25	0.003
02:30	0.003
02:35	0.004
02:40	0.004
02:45	0.004
02:50	0.004
02:55	0.004
03:00	0.004
03:05	0.004
03:10	0.004

03:15	0.004
03:20	0.004
03:25	0.004
03:30	0.004
03:35	0.004
03:40	0.004
03:45	0.004
03:50	0.005
03:55	0.005
04:00	0.005
04:05	0.005
04:10	0.005
04:15	0.005
04:20	0.006
04:25	0.006
04:30	0.006
04:35	0.006
04:40	0.006
04:45	0.006
04:50	0.007
04:55	0.007
05:00	0.007
05:05	0.005
05:10	0.005
05:15	0.005
05:20	0.006
05:25	0.006
05:30	0.006
05:35	0.007
05:40	0.007
05:45	0.007
05:50	0.007
05:55	0.007
06:00	0.007
06:05	0.008
06:10	0.008
06:15	0.008
06:20	0.008
06:25	0.008
06:30	0.008
06:35	0.009
06:40	0.009
06:45	0.009
06:50	0.009
06:55	0.009
07:00	0.009
07:05	0.009
07:10	0.009
07:15	0.009
07:20	0.01
07:25	0.01
07:30	0.01
07:35	0.01
07:40	0.01
07:45	0.01
07:50	0.011
07:55	0.011
08:00	0.011
08:05	0.013
08:10	0.013
08:15	0.013
08:20	0.013
08:25	0.013
08:30	0.013
08:35	0.014
08:40	0.014
08:45	0.014
08:50	0.015
08:55	0.015
09:00	0.015
09:05	0.016
09:10	0.016
09:15	0.016
09:20	0.017
09:25	0.017
09:30	0.017
09:35	0.018
09:40	0.018
09:45	0.018
09:50	0.019
09:55	0.019

10:00	0.019
10:05	0.013
10:10	0.013
10:15	0.013
10:20	0.013
10:25	0.013
10:30	0.013
10:35	0.017
10:40	0.017
10:45	0.017
10:50	0.017
10:55	0.017
11:00	0.017
11:05	0.016
11:10	0.016
11:15	0.016
11:20	0.016
11:25	0.016
11:30	0.016
11:35	0.015
11:40	0.015
11:45	0.015
11:50	0.015
11:55	0.015
12:00	0.015
12:05	0.021
12:10	0.021
12:15	0.021
12:20	0.022
12:25	0.022
12:30	0.022
12:35	0.024
12:40	0.024
12:45	0.024
12:50	0.025
12:55	0.025
13:00	0.025
13:05	0.03
13:10	0.03
13:15	0.03
13:20	0.03
13:25	0.031
13:30	0.031
13:35	0.02
13:40	0.02
13:45	0.02
13:50	0.02
13:55	0.02
14:00	0.02
14:05	0.023
14:10	0.023
14:15	0.024
14:20	0.023
14:25	0.023
14:30	0.023
14:35	0.023
14:40	0.023
14:45	0.023
14:50	0.021
14:55	0.022
15:00	0.022
15:05	0.021
15:10	0.021
15:15	0.021
15:20	0.02
15:25	0.02
15:30	0.02
15:35	0.016
15:40	0.016
15:45	0.016
15:50	0.016
15:55	0.016
16:00	0.016
16:05	0.003
16:10	0.003
16:15	0.003
16:20	0.003
16:25	0.003
16:30	0.003
16:35	0.003
16:40	0.003

16:45	0.003
16:50	0.003
16:55	0.003
17:00	0.003
17:05	0.004
17:10	0.004
17:15	0.004
17:20	0.004
17:25	0.004
17:30	0.004
17:35	0.004
17:40	0.004
17:45	0.004
17:50	0.003
17:55	0.003
18:00	0.003
18:05	0.003
18:10	0.003
18:15	0.003
18:20	0.003
18:25	0.003
18:30	0.003
18:35	0.003
18:40	0.003
18:45	0.003
18:50	0.002
18:55	0.002
19:00	0.002
19:05	0.003
19:10	0.003
19:15	0.003
19:20	0.003
19:25	0.003
19:30	0.003
19:35	0.003
19:40	0.003
19:45	0.003
19:50	0.002
19:55	0.002
20:00	0.002
20:05	0.003
20:10	0.003
20:15	0.003
20:20	0.003
20:25	0.003
20:30	0.003
20:35	0.003
20:40	0.003
20:45	0.003
20:50	0.002
20:55	0.002
21:00	0.002
21:05	0.003
21:10	0.003
21:15	0.003
21:20	0.002
21:25	0.002
21:30	0.002
21:35	0.003
21:40	0.003
21:45	0.003
21:50	0.002
21:55	0.002
22:00	0.002
22:05	0.003
22:10	0.003
22:15	0.003
22:20	0.002
22:25	0.002
22:30	0.002
22:35	0.002
22:40	0.002
22:45	0.002
22:50	0.002
22:55	0.002
23:00	0.002
23:05	0.002
23:10	0.002
23:15	0.002
23:20	0.002
23:25	0.002

			23:30	0.002
			23:35	0.002
			23:40	0.002
			23:45	0.002
			23:50	0.002
			23:55	0.002
			00:00	0.002

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.01063 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	1411	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	307	ft
Elevation Difference	15	ft
Lag Time	**0.034**	**hr**
40% Lag Time	0.8	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Urban Landscaping Good C		69	0.37300	Commercial, Downtown Business or Industrial (90)	90	0.071	6.8	1	0.071 X
						Total area =	6.8		
								Average Soil Loss =	0.071

User Manual
Contact Project Planning **(951) 955-1200**

HEC HMS Preprocessor

Watershed Area 0.01063 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	1411	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	307	ft
Elevation Difference	15	ft
Lag Time	**0.034**	**hr**
40% Lag Time	0.8	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 18 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour		3 Hour		6 Hour		24 Hour	
Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)
						00:05	0.002
						00:10	0.002
						00:15	0.002
						00:20	0.003
						00:25	0.003
						00:30	0.003
						00:35	0.003

00:40	0.003
00:45	0.003
00:50	0.004
00:55	0.004
01:00	0.004
01:05	0.003
01:10	0.003
01:15	0.003
01:20	0.003
01:25	0.003
01:30	0.003
01:35	0.003
01:40	0.003
01:45	0.003
01:50	0.004
01:55	0.004
02:00	0.004
02:05	0.004
02:10	0.004
02:15	0.004
02:20	0.004
02:25	0.004
02:30	0.004
02:35	0.005
02:40	0.005
02:45	0.005
02:50	0.005
02:55	0.005
03:00	0.005
03:05	0.005
03:10	0.005
03:15	0.005
03:20	0.005
03:25	0.005
03:30	0.005
03:35	0.005
03:40	0.005
03:45	0.005
03:50	0.006
03:55	0.006
04:00	0.006
04:05	0.006
04:10	0.006
04:15	0.006
04:20	0.007
04:25	0.007
04:30	0.007
04:35	0.007
04:40	0.007
04:45	0.007
04:50	0.009
04:55	0.009
05:00	0.009
05:05	0.006
05:10	0.006

05:15	0.006
05:20	0.007
05:25	0.007
05:30	0.007
05:35	0.009
05:40	0.009
05:45	0.009
05:50	0.009
05:55	0.009
06:00	0.009
06:05	0.009
06:10	0.009
06:15	0.009
06:20	0.009
06:25	0.009
06:30	0.009
06:35	0.01
06:40	0.01
06:45	0.01
06:50	0.01
06:55	0.01
07:00	0.01
07:05	0.01
07:10	0.01
07:15	0.01
07:20	0.012
07:25	0.012
07:30	0.012
07:35	0.013
07:40	0.013
07:45	0.013
07:50	0.014
07:55	0.014
08:00	0.014
08:05	0.016
08:10	0.016
08:15	0.016
08:20	0.016
08:25	0.016
08:30	0.016
08:35	0.017
08:40	0.017
08:45	0.017
08:50	0.018
08:55	0.018
09:00	0.018
09:05	0.02
09:10	0.02
09:15	0.02
09:20	0.021
09:25	0.021
09:30	0.021
09:35	0.022
09:40	0.022
09:45	0.022

09:50	0.023
09:55	0.023
10:00	0.023
10:05	0.016
10:10	0.016
10:15	0.016
10:20	0.016
10:25	0.016
10:30	0.016
10:35	0.021
10:40	0.021
10:45	0.021
10:50	0.021
10:55	0.021
11:00	0.021
11:05	0.02
11:10	0.02
11:15	0.02
11:20	0.02
11:25	0.02
11:30	0.02
11:35	0.018
11:40	0.018
11:45	0.018
11:50	0.019
11:55	0.019
12:00	0.019
12:05	0.026
12:10	0.026
12:15	0.026
12:20	0.027
12:25	0.027
12:30	0.027
12:35	0.029
12:40	0.029
12:45	0.029
12:50	0.031
12:55	0.031
13:00	0.031
13:05	0.036
13:10	0.036
13:15	0.036
13:20	0.036
13:25	0.036
13:30	0.036
13:35	0.024
13:40	0.024
13:45	0.024
13:50	0.024
13:55	0.024
14:00	0.024
14:05	0.028
14:10	0.028
14:15	0.028
14:20	0.027

14:25	0.027
14:30	0.027
14:35	0.027
14:40	0.027
14:45	0.027
14:50	0.026
14:55	0.026
15:00	0.026
15:05	0.025
15:10	0.025
15:15	0.025
15:20	0.024
15:25	0.024
15:30	0.024
15:35	0.02
15:40	0.02
15:45	0.02
15:50	0.02
15:55	0.02
16:00	0.02
16:05	0.004
16:10	0.004
16:15	0.004
16:20	0.004
16:25	0.004
16:30	0.004
16:35	0.003
16:40	0.003
16:45	0.003
16:50	0.003
16:55	0.003
17:00	0.003
17:05	0.005
17:10	0.005
17:15	0.005
17:20	0.005
17:25	0.005
17:30	0.005
17:35	0.005
17:40	0.005
17:45	0.005
17:50	0.004
17:55	0.004
18:00	0.004
18:05	0.004
18:10	0.004
18:15	0.004
18:20	0.004
18:25	0.004
18:30	0.004
18:35	0.003
18:40	0.003
18:45	0.003
18:50	0.002
18:55	0.002

19:00	0.002
19:05	0.003
19:10	0.003
19:15	0.003
19:20	0.004
19:25	0.004
19:30	0.004
19:35	0.003
19:40	0.003
19:45	0.003
19:50	0.002
19:55	0.002
20:00	0.002
20:05	0.003
20:10	0.003
20:15	0.003
20:20	0.003
20:25	0.003
20:30	0.003
20:35	0.003
20:40	0.003
20:45	0.003
20:50	0.002
20:55	0.002
21:00	0.002
21:05	0.003
21:10	0.003
21:15	0.003
21:20	0.002
21:25	0.002
21:30	0.002
21:35	0.003
21:40	0.003
21:45	0.003
21:50	0.002
21:55	0.002
22:00	0.002
22:05	0.003
22:10	0.003
22:15	0.003
22:20	0.002
22:25	0.002
22:30	0.002
22:35	0.002
22:40	0.002
22:45	0.002
22:50	0.002
22:55	0.002
23:00	0.002
23:05	0.002
23:10	0.002
23:15	0.002
23:20	0.002
23:25	0.002
23:30	0.002

			23:35	0.002
			23:40	0.002
			23:45	0.002
			23:50	0.002
			23:55	0.002
			00:00	0.002

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.002813 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.02	
Length along longest watercourse - L	423	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	101	ft
Elevation Difference	19.4	ft
Lag Time	**0.014**	**hr**
40% Lag Time	0.3	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Fallow N/A C		90	0.13000	Natural or Agriculture (0)	0	0.13	1.8	1	0.13 X
					Total area =		1.8		
								Average Soil Loss =	0.13

User Manual
Contact Project Planning **(951) 955-1200**

HEC HMS Preprocessor

Watershed Area 0.002813 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.02	
Length along longest watercourse - L	423	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	101	ft
Elevation Difference	19.4	ft
Lag Time	**0.014**	**hr**
40% Lag Time	0.3	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)
Low Loss 90 %
Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour		3 Hour		6 Hour		24 Hour	
Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)
						00:05	0
						00:10	0
						00:15	0
						00:20	0
						00:25	0
						00:30	0
						00:35	0

00:40	0
00:45	0
00:50	0
00:55	0
01:00	0
01:05	0
01:10	0
01:15	0
01:20	0
01:25	0
01:30	0
01:35	0
01:40	0
01:45	0
01:50	0
01:55	0
02:00	0
02:05	0
02:10	0
02:15	0
02:20	0
02:25	0
02:30	0
02:35	0.001
02:40	0.001
02:45	0.001
02:50	0.001
02:55	0.001
03:00	0.001
03:05	0.001
03:10	0.001
03:15	0.001
03:20	0.001
03:25	0.001
03:30	0.001
03:35	0.001
03:40	0.001
03:45	0.001
03:50	0.001
03:55	0.001
04:00	0.001
04:05	0.001
04:10	0.001
04:15	0.001
04:20	0.001
04:25	0.001
04:30	0.001
04:35	0.001
04:40	0.001
04:45	0.001
04:50	0.001
04:55	0.001
05:00	0.001
05:05	0.001
05:10	0.001

05:15	0.001
05:20	0.001
05:25	0.001
05:30	0.001
05:35	0.001
05:40	0.001
05:45	0.001
05:50	0.001
05:55	0.001
06:00	0.001
06:05	0.001
06:10	0.001
06:15	0.001
06:20	0.001
06:25	0.001
06:30	0.001
06:35	0.001
06:40	0.001
06:45	0.001
06:50	0.001
06:55	0.001
07:00	0.001
07:05	0.001
07:10	0.001
07:15	0.001
07:20	0.001
07:25	0.001
07:30	0.001
07:35	0.001
07:40	0.001
07:45	0.001
07:50	0.001
07:55	0.001
08:00	0.001
08:05	0.003
08:10	0.003
08:15	0.003
08:20	0.003
08:25	0.003
08:30	0.003
08:35	0.004
08:40	0.004
08:45	0.004
08:50	0.006
08:55	0.006
09:00	0.006
09:05	0.008
09:10	0.008
09:15	0.008
09:20	0.009
09:25	0.009
09:30	0.009
09:35	0.01
09:40	0.01
09:45	0.01

09:50	0.011
09:55	0.011
10:00	0.012
10:05	0.004
10:10	0.004
10:15	0.004
10:20	0.005
10:25	0.005
10:30	0.005
10:35	0.01
10:40	0.01
10:45	0.01
10:50	0.01
10:55	0.01
11:00	0.01
11:05	0.009
11:10	0.009
11:15	0.009
11:20	0.009
11:25	0.009
11:30	0.009
11:35	0.008
11:40	0.008
11:45	0.008
11:50	0.009
11:55	0.009
12:00	0.009
12:05	0.016
12:10	0.016
12:15	0.016
12:20	0.017
12:25	0.017
12:30	0.018
12:35	0.019
12:40	0.02
12:45	0.02
12:50	0.021
12:55	0.021
13:00	0.021
13:05	0.026
13:10	0.026
13:15	0.026
13:20	0.026
13:25	0.026
13:30	0.026
13:35	0.015
13:40	0.015
13:45	0.015
13:50	0.015
13:55	0.015
14:00	0.015
14:05	0.019
14:10	0.019
14:15	0.019
14:20	0.019

14:25	0.019
14:30	0.019
14:35	0.019
14:40	0.019
14:45	0.019
14:50	0.018
14:55	0.018
15:00	0.018
15:05	0.017
15:10	0.017
15:15	0.017
15:20	0.016
15:25	0.016
15:30	0.016
15:35	0.012
15:40	0.012
15:45	0.012
15:50	0.012
15:55	0.012
16:00	0.012
16:05	0
16:10	0
16:15	0
16:20	0
16:25	0
16:30	0
16:35	0
16:40	0
16:45	0
16:50	0
16:55	0
17:00	0
17:05	0.001
17:10	0.001
17:15	0.001
17:20	0.001
17:25	0.001
17:30	0.001
17:35	0.001
17:40	0.001
17:45	0.001
17:50	0
17:55	0
18:00	0
18:05	0
18:10	0
18:15	0
18:20	0
18:25	0
18:30	0
18:35	0
18:40	0
18:45	0
18:50	0
18:55	0

19:00	0
19:05	0
19:10	0
19:15	0
19:20	0
19:25	0
19:30	0
19:35	0
19:40	0
19:45	0
19:50	0
19:55	0
20:00	0
20:05	0
20:10	0
20:15	0
20:20	0
20:25	0
20:30	0
20:35	0
20:40	0
20:45	0
20:50	0
20:55	0
21:00	0
21:05	0
21:10	0
21:15	0
21:20	0
21:25	0
21:30	0
21:35	0
21:40	0
21:45	0
21:50	0
21:55	0
22:00	0
22:05	0
22:10	0
22:15	0
22:20	0
22:25	0
22:30	0
22:35	0
22:40	0
22:45	0
22:50	0
22:55	0
23:00	0
23:05	0
23:10	0
23:15	0
23:20	0
23:25	0
23:30	0

			23:35	0
			23:40	0
			23:45	0
			23:50	0
			23:55	0
			00:00	0

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.001094 sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation in.	Point Precipitation in.	Point Precipitation in.	Point Precipitation 3.15 in.
Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation	Adjusted Point Precipitation 3.15
Slope of Rainfall Intensity - Duration Curve			

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	437	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	131	ft
Elevation Difference	3.8	ft
Lag Time	**0.017**	**hr**
40% Lag Time	0.4	min

Run

Loss Rate Data Effective Rainfall S-Graphs

(●) Average Adjusted Loss Rate Calculator (Plate E-2.1) ( ) Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: II

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn	Land Use	Imp. Area Decimal %	Adj.Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)

			Rate (in/hr)						
Urban Landscaping Good C		69	0.37300	Commercial, Downtown Business or Industrial (90)	90	0.071	0.7	1	0.071 X
						Total area =	0.7		
								Average Soil Loss =	0.071

HEC HMS Preprocessor

User Manual
Contact Project Planning **(951) 955-1200**

Watershed Area 0.001094 sq mi

1 Hour Storm		3 Hour Storm		6 Hour Storm		24 Hour Storm	
Point Precipitation	in.	Point Precipitation	in.	Point Precipitation	in.	Point Precipitation	3.15 in.
Areal Adjustment Factor	%	Areal Adjustment Factor	%	Areal Adjustment Factor	%	Areal Adjustment Factor	100 %
Adjusted Point Precipitation		Adjusted Point Precipitation		Adjusted Point Precipitation		Adjusted Point Precipitation	3.15
Slope of Rainfall Intensity - Duration Curve							

Lag Time Calculator

Basin Factor - n	0.015	
Length along longest watercourse - L	437	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	131	ft
Elevation Difference	3.8	ft
Lag Time	**0.017**	**hr**
40% Lag Time	0.4	min

Run

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period 5 min (Use interval less than 40% of lag time)

Low Loss 18 %

Fm (Percentage of F) (24-hour Storm Only) 50 % (Typically 50-75%)

Run

1 Hour		3 Hour		6 Hour		24 Hour	
Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)	Unit Time	Effective Rainfall (inches)
						00:05	0.002
						00:10	0.002
						00:15	0.002
						00:20	0.003
						00:25	0.003
						00:30	0.003
						00:35	0.003

00:40	0.003
00:45	0.003
00:50	0.003
00:55	0.003
01:00	0.003
01:05	0.003
01:10	0.003
01:15	0.003
01:20	0.003
01:25	0.003
01:30	0.003
01:35	0.003
01:40	0.003
01:45	0.003
01:50	0.003
01:55	0.003
02:00	0.003
02:05	0.003
02:10	0.003
02:15	0.003
02:20	0.003
02:25	0.003
02:30	0.003
02:35	0.004
02:40	0.004
02:45	0.004
02:50	0.004
02:55	0.004
03:00	0.004
03:05	0.004
03:10	0.004
03:15	0.004
03:20	0.004
03:25	0.004
03:30	0.004
03:35	0.004
03:40	0.004
03:45	0.004
03:50	0.005
03:55	0.005
04:00	0.005
04:05	0.005
04:10	0.005
04:15	0.005
04:20	0.006
04:25	0.006
04:30	0.006
04:35	0.006
04:40	0.006
04:45	0.006
04:50	0.007
04:55	0.007
05:00	0.007
05:05	0.005
05:10	0.005

05:15	0.005
05:20	0.006
05:25	0.006
05:30	0.006
05:35	0.007
05:40	0.007
05:45	0.007
05:50	0.007
05:55	0.007
06:00	0.007
06:05	0.008
06:10	0.008
06:15	0.008
06:20	0.008
06:25	0.008
06:30	0.008
06:35	0.009
06:40	0.009
06:45	0.009
06:50	0.009
06:55	0.009
07:00	0.009
07:05	0.009
07:10	0.009
07:15	0.009
07:20	0.01
07:25	0.01
07:30	0.01
07:35	0.01
07:40	0.01
07:45	0.01
07:50	0.011
07:55	0.011
08:00	0.011
08:05	0.013
08:10	0.013
08:15	0.013
08:20	0.013
08:25	0.013
08:30	0.013
08:35	0.014
08:40	0.014
08:45	0.014
08:50	0.015
08:55	0.015
09:00	0.015
09:05	0.016
09:10	0.016
09:15	0.016
09:20	0.017
09:25	0.017
09:30	0.017
09:35	0.018
09:40	0.018
09:45	0.018

09:50	0.019
09:55	0.019
10:00	0.019
10:05	0.013
10:10	0.013
10:15	0.013
10:20	0.013
10:25	0.013
10:30	0.013
10:35	0.017
10:40	0.017
10:45	0.017
10:50	0.017
10:55	0.017
11:00	0.017
11:05	0.016
11:10	0.016
11:15	0.016
11:20	0.016
11:25	0.016
11:30	0.016
11:35	0.015
11:40	0.015
11:45	0.015
11:50	0.015
11:55	0.015
12:00	0.015
12:05	0.021
12:10	0.021
12:15	0.021
12:20	0.022
12:25	0.022
12:30	0.022
12:35	0.024
12:40	0.024
12:45	0.024
12:50	0.025
12:55	0.025
13:00	0.025
13:05	0.03
13:10	0.03
13:15	0.03
13:20	0.03
13:25	0.031
13:30	0.031
13:35	0.02
13:40	0.02
13:45	0.02
13:50	0.02
13:55	0.02
14:00	0.02
14:05	0.023
14:10	0.023
14:15	0.024
14:20	0.023

14:25	0.023
14:30	0.023
14:35	0.023
14:40	0.023
14:45	0.023
14:50	0.021
14:55	0.022
15:00	0.022
15:05	0.021
15:10	0.021
15:15	0.021
15:20	0.02
15:25	0.02
15:30	0.02
15:35	0.016
15:40	0.016
15:45	0.016
15:50	0.016
15:55	0.016
16:00	0.016
16:05	0.003
16:10	0.003
16:15	0.003
16:20	0.003
16:25	0.003
16:30	0.003
16:35	0.003
16:40	0.003
16:45	0.003
16:50	0.003
16:55	0.003
17:00	0.003
17:05	0.004
17:10	0.004
17:15	0.004
17:20	0.004
17:25	0.004
17:30	0.004
17:35	0.004
17:40	0.004
17:45	0.004
17:50	0.003
17:55	0.003
18:00	0.003
18:05	0.003
18:10	0.003
18:15	0.003
18:20	0.003
18:25	0.003
18:30	0.003
18:35	0.003
18:40	0.003
18:45	0.003
18:50	0.002
18:55	0.002

19:00	0.002
19:05	0.003
19:10	0.003
19:15	0.003
19:20	0.003
19:25	0.003
19:30	0.003
19:35	0.003
19:40	0.003
19:45	0.003
19:50	0.002
19:55	0.002
20:00	0.002
20:05	0.003
20:10	0.003
20:15	0.003
20:20	0.003
20:25	0.003
20:30	0.003
20:35	0.003
20:40	0.003
20:45	0.003
20:50	0.002
20:55	0.002
21:00	0.002
21:05	0.003
21:10	0.003
21:15	0.003
21:20	0.002
21:25	0.002
21:30	0.002
21:35	0.003
21:40	0.003
21:45	0.003
21:50	0.002
21:55	0.002
22:00	0.002
22:05	0.003
22:10	0.003
22:15	0.003
22:20	0.002
22:25	0.002
22:30	0.002
22:35	0.002
22:40	0.002
22:45	0.002
22:50	0.002
22:55	0.002
23:00	0.002
23:05	0.002
23:10	0.002
23:15	0.002
23:20	0.002
23:25	0.002
23:30	0.002

			23:35	0.002
			23:40	0.002
			23:45	0.002
			23:50	0.002
			23:55	0.002
			00:00	0.002

Phelan-Seaton - Basin 100 & Basin 200 - S-Graph
PRE-PROJECT & POST-PROJECT

Note: Since both Basin 100 and Basin 200 have used 100% of the "Valley S-Graph", the same data set was used.

S-Graph 100% Valley	
Time in Percent of Lag	**Discharge (Percent)**
0	0
12	2
21	4
28	6
34	8
39	10
44	12
48	14
51	16
55	18
58	20
61	22
64	24
67	26
70	28
73	30
75	32
78	34
81	36
83	38
86	40
89	42
92	44
94	46
97	48
100	50
103	52
107	54
111	56
115	58
120	60
126	62
132	64
138	66
146	68
154	70
164	72
174	74
186	76
200	78
215	80
233	82
254	84
279	86
309	88
343	90
386	92
440	94
508	96
611	98
820	100