DRAINAGE STUDY
For:

Palm Hollister Apartments

PTS#:698277

APN 628-050-24-00
555 Hollister Street
San Diego, CA 92154

Prepared By:

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October 2021
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1. INTRODUCTION

1.1 Project Description

The project is located on a 5.92-acre site in the Otay Mesa-Nestor Community Plan area, north of Palm Avenue and east of Hollister Street in San Diego, California.

The project proposes to construct multi-family housing, walkways, parking areas, drive aisles, landscaping and amenities including a pool, bbq pavilion area, fitness center, co-working spaces, nature playground, game courts and seating areas.

Vicinity Map
Not to Scale

1.2 Existing Conditions

The project site consists of a previously graded large flat open space area composed mainly of dirt, with some vegetation and a few vacant structures. There is a steep northward facing vegetated slope along the north side of the site.

In the existing condition, the site consists of two major drainage basins. Drainage Basin 100 is the smaller of the two basins and includes the eastern portion of the site. Storm water flows overland from the southeastern corner of the site in a northerly direction and discharges along the northeastern border.

Drainage Basin 200 consists of the remainder of the site, the central and western portion. Stormwater flows overland from the southern border of the site in a northwesterly direction and discharges along the northern border.

Offsite runoff from a small area south of the site runs onto the site along the southeastern border.

For the locations of the existing drainage basins and discharge points refer to the Existing Condition Hydrology Exhibit located in Appendix 1.

Per the United States Department of Agriculture Web Soil Survey, the project site is underlain with Hydrologic Soil Group A and D soils. Refer to Appendix 2 for soil information.

Using the Rational Method procedure outlined in the 2017 City of San Diego Drainage Design Manual, a peak flow rate was calculated for the existing condition 100-year, 6-hour storm event. The table below summarizes the existing condition hydrologic data.

Summary of Existing Condition 100-yr Peak Discharge Rates

Discharge Node	Area (ac)	Q100 (cfs)
115	1.5	1.76
215	4.0	3.55

Refer to the existing condition hydrologic calculations included in Appendix 2 for detailed analysis.

1.3 Proposed Conditions

The proposed project consists of the construction of multi-family housing, walkways, parking areas, drive aisles, landscaping and amenities including a pool, bbq pavilion area, fitness center, co-working spaces, nature playground, game courts and seating areas.

In the proposed condition, the site consists of two major drainage basins to mimic the existing condition. Drainage Basin 100 is the smaller of the two basins and includes the eastern portion of the site. All onsite storm water from Drainage Basin 100, except for landscaped perimeter slopes, will be captured in proposed storm drain and conveyed to an open-bottom underground vault located in the central area of Drainage Basin 100. The underground vault will provide storage to mitigate the 100-year storm event. Flow from the vault will be conveyed northerly and discharge along the northeastern border as in the existing condition. Runoff from the landscaped perimeter slopes will not be conveyed to the vault and will discharge along the northeastern border.

Drainage Basin 200 consists of the remainder of the site, the central and western portions. Onsite storm water from Drainage Basin 200, except for landscaped perimeter slopes, will be captured in proposed storm drain and conveyed to an open-bottom underground vault located in the central area of Drainage Basin 200. The underground vault will provide storage to mitigate the 100-year storm event. Flow from the vault will be conveyed northerly and discharge along the northern border as in the existing condition. Runoff from the landscaped perimeter slopes will not be conveyed to the vault and will discharge along the northern border.

Existing offsite runoff from a small area south of the site that runs onto the site along the southeastern border will be captured in proposed storm drain and bypassed through the site and will discharge at the Drainage Basin 100 discharge location.

The proposed underground storage vaults provide mitigation for the 100-year storm event peak discharge. The vaults are sized to provide additional detention to mitigate for flow from the areas that bypass the vaults so that the final discharge is less than the existing condition. Each vault will be open-bottom above a gravel layer to provide partial infiltration per the Geotechnical Report recommendation. For the locations of the proposed drainage basins and discharge points refer to the Proposed Condition Hydrology Exhibit located in Appendix 1.

Using the Rational Method procedure outlined in the 2017 City of San Diego Drainage Design Manual, a peak flow rate was calculated for the proposed condition 100-year, 6-hour storm event. The table below summarizes the proposed condition hydrologic data.

Summary of Proposed Condition 100-yr Peak Discharge Rates

Discharge Node	Area (ac)	Q100 (cfs)	Q100 (cfs) Detained
150	1.9	6.94	1.55
265	3.7	13.44	3.24

Refer to the proposed condition hydrologic calculations included in Appendix 2 for detailed analysis.

1.4 Most Intense Use Conditions

The proposed project requires an amendment to the Otay Mesa-Nestor Community Plan to change the existing land use designation from Open Space to Residential Medium-High Density (20-35 du/nra) and a Rezone to change the existing zone from AR-1-2, RM-1-1, and RS-1-5 to RM-2-6. A Rezone requires the proposed project analyze the most intense use permitted under the new zone. Under the proposed RM-2-6 zone, the project site could be developed to construct up to 206 dwelling units. This equates to an additional eight dwelling units compared to the proposed project, which plans to construct a total of 198 dwelling units. Adding eight dwelling units would not affect the drainage study as the total proposed pervious and impervious areas would remain unchanged.

1.5 100-Year Floodplain Analysis

The project is along the southerly edge of the Otay River. The effective 100-year floodplain width varies from approximately 2,300 to 3,100 feet along the site. The maximum floodplain encroachment from the project is approximately 20 feet or less than 1 percent. The project does not encroach into the floodway, so it meets floodway regulations. Existing and proposed condition 100-year HEC-RAS analyses were performed and are included in Appendix 4. The results showed that the 100-year water surface elevations

remained unchanged in many locations and did not vary more than 0.01 feet. The variation is well within the FEMA tie-in tolerance of 0.5 feet. Since the project has such a minor effect on the water surface elevations and the plan view floodplain, we do not believe it is necessary to process a CLOMR and LOMR. A CLOMR and LOMR would essentially preserve the existing elevations and the only alteration to the floodplain plotting will be a very minor realignment along the proposed wall. Such realignment would not be noticeable at the scale of the FIRM.

2. METHODOLOGY

Pursuant to the 2017 City of San Diego Drainage Design Manual, the Rational Method is recommended for analyzing the runoff response from drainage areas less than 0.5 square mile, therefore the Rational Method was used to analyze this project's hydrologic characteristics.

2.1 Rational Method

Runoff was calculated for the 100-year, 6-hour storm event using the Rational Method which is calculated using the following equation:

$Q = C \times I \times A$ Equation A-1 of 2017 City of SD Drainage Design Manual

Where:

Q = Flow rate in cubic feet per second (cfs)
C = Runoff coefficient (Table A-1 of City of SD Drainage Design Manual)
I = Rainfall Intensity in inches per hour (in/hr)
A = Drainage basin area in acres (ac)

2.2 Runoff Coefficient

The runoff coefficients for the project are based on Table A-1 and Footnote 2 from the 2017 City of San Diego Drainage Design Manual.

2.3 Rainfall Intensity

Rainfall intensity was determined using the Rainfall Intensity-Duration-Frequency Curves shown in Section A.1.3 of the 2017 City of San Diego Drainage Design Manual. Based on Figure A-1 and a 5-minute time of concentration, the 100-year intensity is 4.4 inches per hour.

2.4 Detention

The underground storage vaults provide mitigation for the 100-year storm event peak flow rate. The 100-year storm event detention analysis was performed using HydroCAD Stormwater Modeling software. The inflow runoff hydrographs to the vaults were modeled using RatHydro which is a Rational Method Design Storm Hydrograph software that creates a hydrograph using the results of the Rational Method calculations. HydroCAD has the ability to route the 100-year 6-hour storm event inflow hydrograph through the facilities considering dynamic tailwater effects. Based on the facility cross sectional geometry, stage storage and outlet structure data, HydroCAD calculates the detained peak flow rate and detained time to peak.

Based on the results of the HydroCAD analysis, mitigation for the 100-year storm event peak flow rate is provided, detaining the peak flow rate in the proposed condition to below the existing condition. Vault 1, located on the east half of the site is 1,100 square feet, 5.67 feet high, and includes a 26" deep gravel layer below the vault discharge pipe, providing a total storage volume of 7,192 cubic feet. Vault 2, located on the west half of the site, is 2,300 square feet, 5.67 feet high and includes a 23" gravel layer below the vault discharge pipe, providing a total storage volume of 14,807 cubic feet. Refer to Appendix 3 for the HydroCAD detention calculations and the plans for details of each facility.

2.5 Section 401/404 Water Quality Certification

This project does not have any waters of the United States (e.g., creek, drainage, wetland) on the property and does not require Federal permitting or approval.

3. CALCULATIONS / RESULTS

3.1 Existing and Proposed Peak Flow Comparison

The table below summarizes the 100-year 6-hour peak flow rate calculations for the project.

Summary of 100-yr Peak Discharge Rates

Existing					Proposed					Detained	
Discharge Node	Area (ac)	Runoff Coeff. C	Q100 (cfs)	V100 (ft/sec)	Discharge Node	Area (ac)	Runoff Coeff. C	Q100 (cfs)	V100 (ft/sec)	Q100 (cfs)	V100 (ft/sec)
115	1.5	0.35	1.76	1.71	150	1.9	0.95	6.94	10.94	1.55	6.99
215	4.0	0.35	3.55	1.39	265	3.7	0.95	13.44	14.77	3.24	10.19

In the proposed detained condition, the 100-year storm event peak discharge rates are lower than the existing flow rates. The proposed detained 100-year velocity will be dissipated below existing condition rates with large outfall structures and riprap pads as detailed on the grading plans so that no adverse impacts will occur downstream.

4. CONCLUSION

Based upon the analyses included in this report, the proposed underground vaults adequately mitigate the increase in peak runoff in the proposed condition to below the existing condition. The proposed project is designed to honor the existing condition discharge locations and flow rates so that there are no negative impacts to the downstream system or adjacent properties.

Appendix 1

Existing and Proposed Hydrology Exhibits

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
BASIN BOUNDARY	
BASIN SUBAREA BOUNDARY	
FLOW PATH	
BASIN SUBAREA	A=1.56
BASIN SUMMARY Q100 EXISTING (PRE MITIGATION)	(XX) X.XX AC | X.XX CFS

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: A & D

DEPTH TO GROUNDWATER

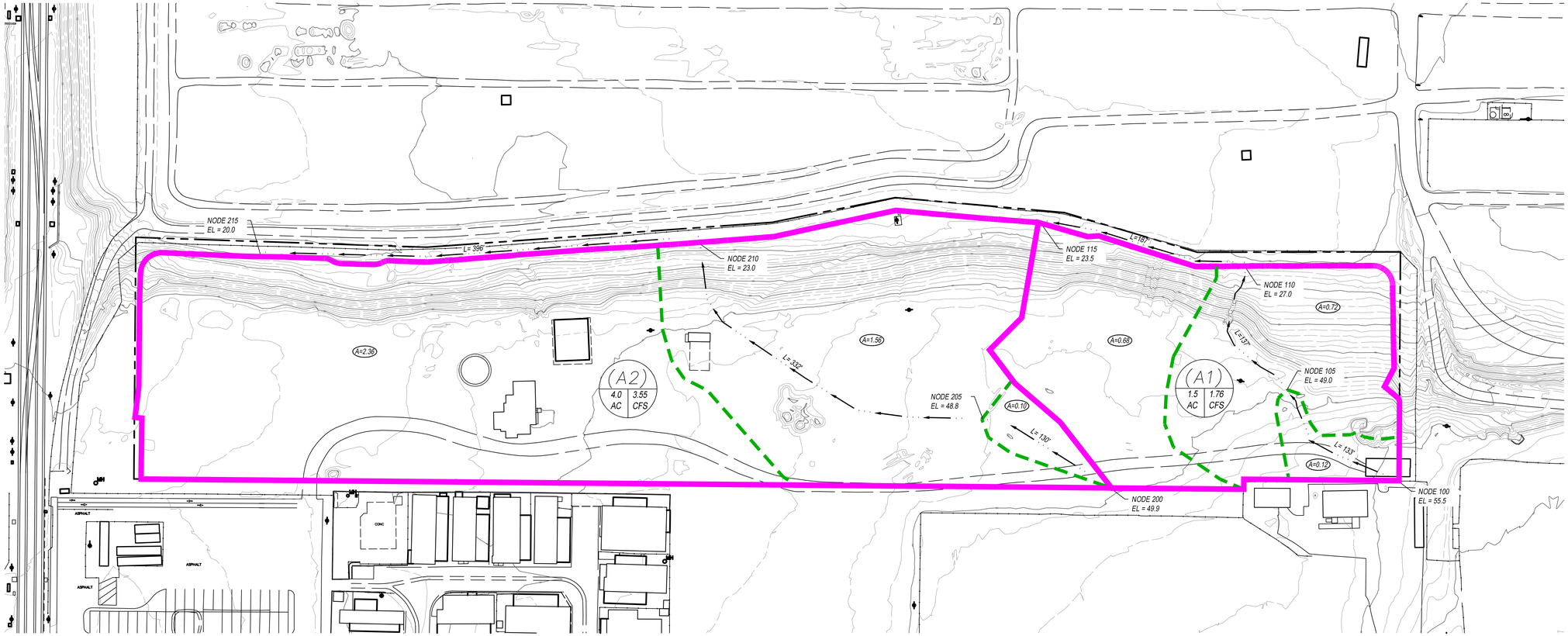
5 FT <GROUNDWATER DEPTH > 10 FT

PROJECT CHARACTERISTICS

TOTAL SITE AREA:	5.92 AC
EXISTING IMPERVIOUS AREA:	0.07 AC
EXISTING LANDSCAPE AREA:	5.85 AC

SUMMARY OF EXISTING CONDITIONS

EXIST. DRAINAGE BASIN	EXIST. DRAINAGE AREA (AC)	RUNOFF COEFFICIENT, C	Q100 (CFS)
(A1)	1.5	0.35	1.76
(A2)	4.0	0.35	3.55



PASCO LARET SUITER & ASSOCIATES

San Diego | Encinitas | Orange County

Phone 858.259.8212 | www.plsaengineering.com

EXISTING CONDITION DRAINAGE EXHIBIT

PALM AND HOLLISTER
SAN DIEGO, CA
PLSA JOB # 3272
SCALE 1"=50'
OCTOBER 2021
SHEET 1 OF 1

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
BASIN BOUNDARY	
BASIN SUBAREA BOUNDARY	
FLOW DIRECTION	
PROPOSED IMPERVIOUS AREA	
BASIN SUBAREA	A=1.56
BASIN SUMMARY Q100	XX / XXX AC / XXX CFS

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: A & D

DEPTH TO GROUNDWATER

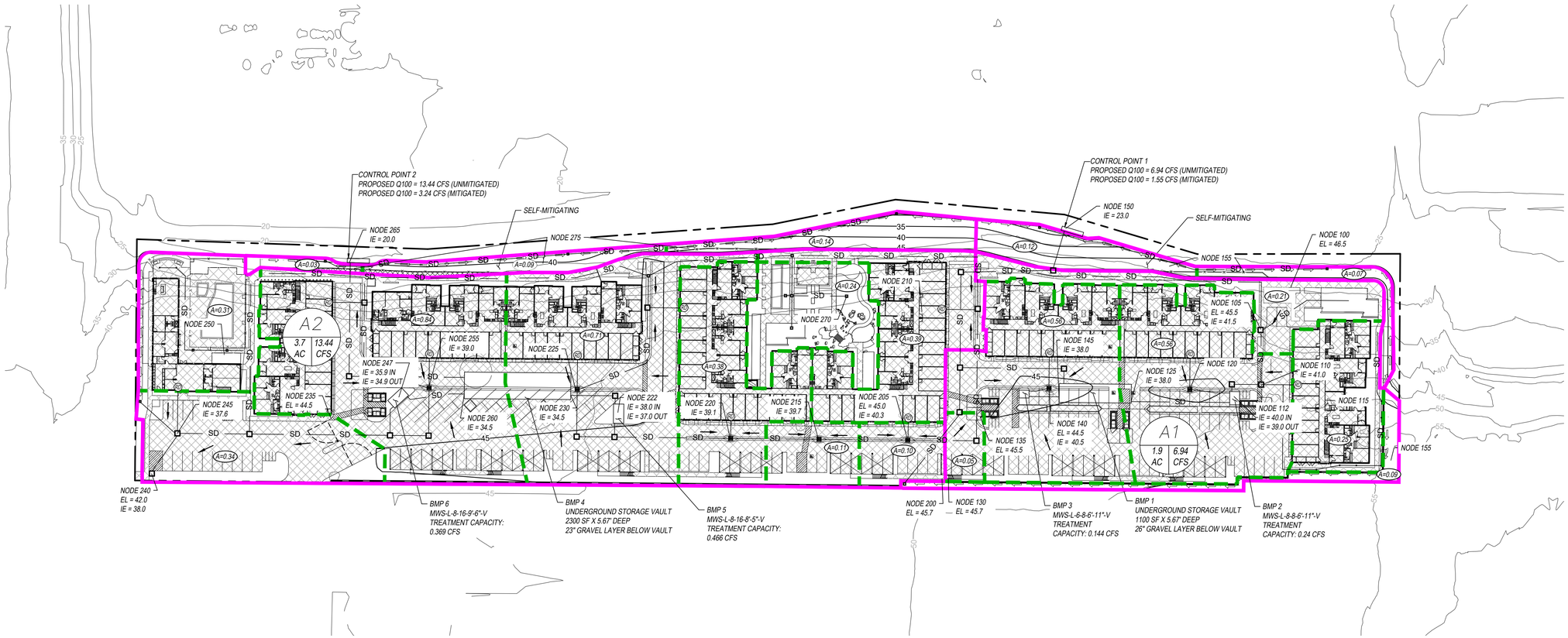
5 FT <GROUNDWATER DEPTH > 10 FT

PROJECT CHARACTERISTICS

TOTAL SITE AREA:	5.92 AC
PROPOSED DISTURBED AREA:	5.59 AC
PROPOSED IMPERVIOUS AREA:	4.28 AC
PROPOSED LANDSCAPE AREA:	1.31 AC

SUMMARY OF PROPOSED CONDITIONS

DRAINAGE BASIN	DRAINAGE AREA (AC)	RUNOFF COEFFICIENT, C	Q100 (CFS)	Q100 DETAINED (CFS)
A1	1.9	0.95	6.94	1.55
A2	3.7	0.95	13.44	3.24



50' 25' 0 50' 100' 150'

GRAPHIC SCALE: 1" = 50'

PROPOSED CONDITION DRAINAGE EXHIBIT

PALM AND HOLLISTER
SAN DIEGO, CA
PLSA JOB # 3272
SCALE 1"=50'
APRIL 2023
SHEET 1 OF 1

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Appendix 2

Hydrology Support Material and Calculations

Table A-1. Runoff Coefficients for Rational Method

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

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

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

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

A.1.3. Rainfall Intensity

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

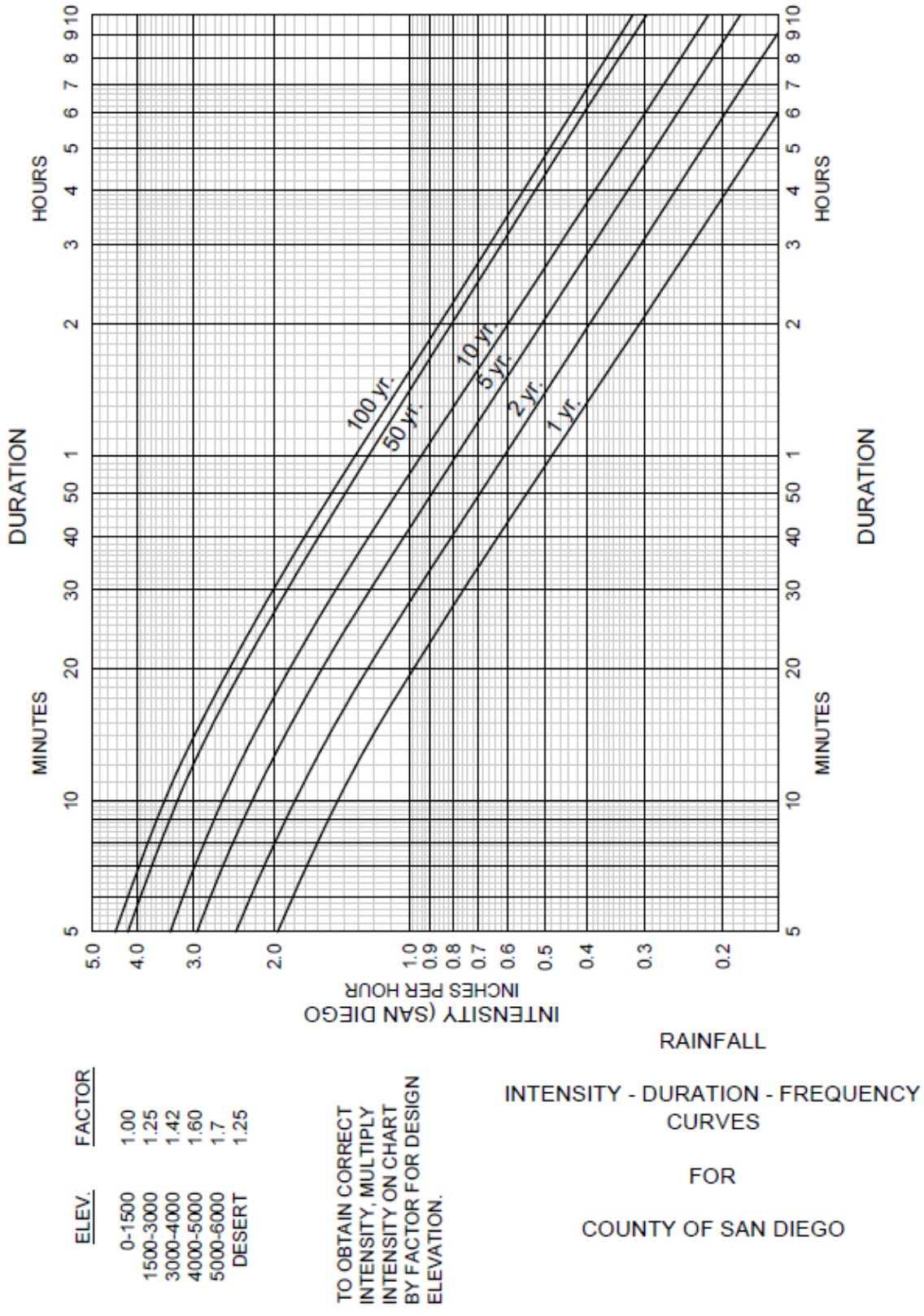
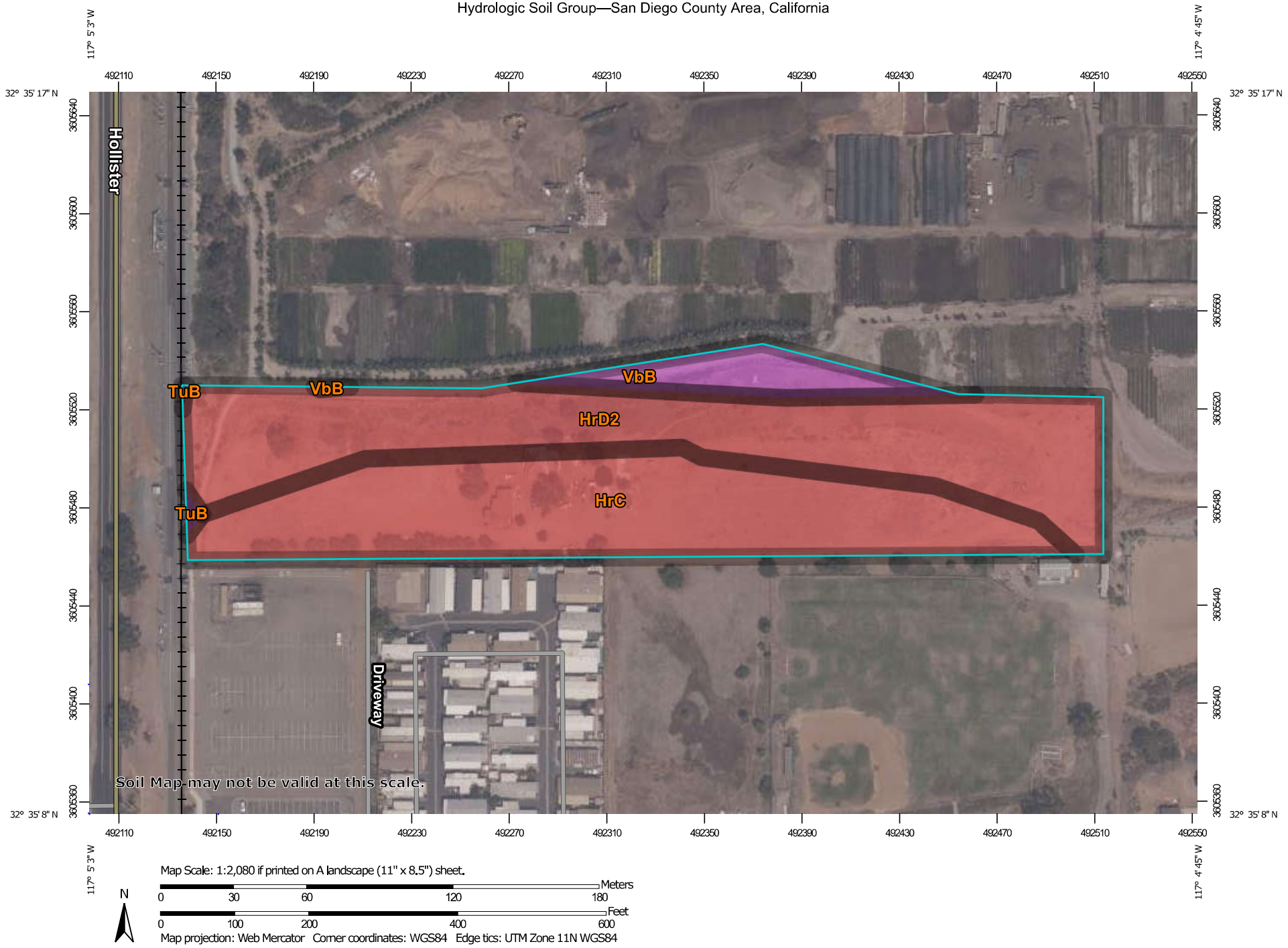


Figure A-1. Intensity-Duration-Frequency Design Chart



Map Scale: 1:2,080 if printed on A landscape (11" x 8.5") 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 1:24,000.

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

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

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

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

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

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

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

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HrC	Huerhuero loam, 2 to 9 percent slopes	D	3.0	44.4%
HrD2	Huerhuero loam, 9 to 15 percent slopes, eroded	D	3.3	48.1%
TuB	Tujunga sand, 0 to 5 percent slopes	A	0.0	0.2%
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	A	0.5	7.2%
Totals for Area of Interest			**6.8**	**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

Existing Condition

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                            Analysis prepared by:

                       PASCO LARET SUITER & ASSOCIATES
                         535 NORTH HIGHWAY 101, STE A
                            SOLANA BEACH, CA 92075
                                 858-259-8212

 ************************* DESCRIPTION OF STUDY *************************
* 3272  PALM AND HOLLISTER                                              *
* EXISTING CONDITION                                                    *
* 100-YR                                                                *
 ************************************************************************

  FILE NAME: 3272E00.DAT
  TIME/DATE OF STUDY: 11:56 09/14/2021
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  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    100.00 TO NODE    105.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   133.00
  UPSTREAM ELEVATION(FEET) =     55.50
  DOWNSTREAM ELEVATION(FEET) =     49.00
  ELEVATION DIFFERENCE(FEET) =      6.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.956
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
```

```
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.838
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     49.00  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   137.00   CHANNEL SLOPE =  0.1606
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.587
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.61
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.73
 AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.32
 Tc(MIN.) =    9.28
 SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    0.90
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.05

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.26
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     270.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     23.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0187
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.317
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
 AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.93
 Tc(MIN.) =   11.21
 SUBAREA AREA(ACRES) =     0.68       SUBAREA RUNOFF(CFS) =    0.79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.76

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     457.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =     49.90
 DOWNSTREAM ELEVATION(FEET) =     48.80
 ELEVATION DIFFERENCE(FEET) =      1.10
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.405
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    63.85
```

```
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.295
 SUBAREA RUNOFF(CFS) =      0.12
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     48.80  DOWNSTREAM(FEET) =     23.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   332.00   CHANNEL SLOPE =  0.0777
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.961
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.93
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.82
 AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   3.04
 Tc(MIN.) =   14.45
 SUBAREA AREA(ACRES) =     1.56       SUBAREA RUNOFF(CFS) =    1.62
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =       1.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.24
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     462.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     23.00  DOWNSTREAM(FEET) =     20.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.0076
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.523
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
 AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   5.26
 Tc(MIN.) =   19.71
 SUBAREA AREA(ACRES) =     2.36       SUBAREA RUNOFF(CFS) =    2.08
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        4.0         PEAK FLOW RATE(CFS) =       3.55

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   1.39
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     858.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        4.0  TC(MIN.) =     19.71
 PEAK FLOW RATE(CFS)   =       3.55
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Proposed Condition

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
            Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                          Analysis prepared by:

                      Pasco Laret Suiter & Associates
                             119 Aberdeen Drive
                           Cardiff, California 92007
                                858-259-8212

 ************************* DESCRIPTION OF STUDY *************************
* 3272  PALM AND HOLLISTER                                                *
* PROPOSED CONDITION                                                      *
* 100-YR                                                                  *
 ************************************************************************

  FILE NAME: 3272P00.DAT
  TIME/DATE OF STUDY: 10:34 04/03/2023
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *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   12.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  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    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    46.00
  UPSTREAM ELEVATION(FEET) =     46.50
  DOWNSTREAM ELEVATION(FEET) =     45.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.414
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.50  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    45.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.88
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =      91.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.362
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =       0.5   TOTAL RUNOFF(CFS) =       1.91
  TC(MIN.) =    5.20

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    26.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.91
```

```
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.26
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     118.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.350
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.56   SUBAREA RUNOFF(CFS) =    2.31
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.22
 TC(MIN.) =    5.26

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.00  DOWNSTREAM(FEET) =    38.00
 FLOW LENGTH(FEET) =    89.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.22
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.53
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =    5.53
 RAINFALL INTENSITY(INCH/HR) =   4.30
 TOTAL STREAM AREA(ACRES) =     1.02
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.22

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    63.00
 UPSTREAM ELEVATION(FEET) =     45.70
 DOWNSTREAM ELEVATION(FEET) =     45.50
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.405
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   45.50  DOWNSTREAM ELEVATION(FEET) =   44.50
 STREET LENGTH(FEET) =    86.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    8.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =    5.80
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.248
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
 SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    2.26
 TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.55
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =     149.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    40.50  DOWNSTREAM(FEET) =    38.00
 FLOW LENGTH(FEET) =    45.10   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.46
```

```
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    5.89
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =     194.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    125.00 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) =   4.23
 TOTAL STREAM AREA(ACRES) =     0.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.46

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.22     5.53        4.300          1.02
     2        2.46     5.89        4.232          0.61

 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        6.53     5.53       4.300
     2        6.61     5.89       4.232

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.61   Tc(MIN.) =    5.89
 TOTAL AREA(ACRES) =        1.6
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    23.00
 FLOW LENGTH(FEET) =   294.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.94
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.61
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    6.33
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     501.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.147
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8767
 SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.52
 TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       6.94
 TC(MIN.) =    6.33
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =     45.70
  DOWNSTREAM ELEVATION(FEET) =     45.00
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.563
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.63
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.05
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.30  DOWNSTREAM(FEET) =    39.70
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.31
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.340
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.45
 TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.47
 TC(MIN.) =    5.31

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.70  DOWNSTREAM(FEET) =    39.10
 FLOW LENGTH(FEET) =    76.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.26
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.47
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    5.61
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =     198.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    1.55
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.99
 TC(MIN.) =    5.61

****************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.10  DOWNSTREAM(FEET) =    38.00
 FLOW LENGTH(FEET) =   114.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.99
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    5.98
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    222.00 =     313.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    225.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    2.84
 TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       6.77
```

```
 TC(MIN.) =    5.98

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8940
 SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.51
 TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       7.27
 TC(MIN.) =    5.98

****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    34.50
 FLOW LENGTH(FEET) =    45.80   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.41
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.27
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.05
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     359.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 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.) =    6.05
 RAINFALL INTENSITY(INCH/HR) =   4.20
 TOTAL STREAM AREA(ACRES) =     1.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.27

****************************************************************************
 FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   165.00
 UPSTREAM ELEVATION(FEET) =     44.50
 DOWNSTREAM ELEVATION(FEET) =     42.00
 ELEVATION DIFFERENCE(FEET) =      2.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.897
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    65.15
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    37.60
 FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.42
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.16
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    245.00 =     204.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    245.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.369
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    1.29
 TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.70
 TC(MIN.) =    5.16

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    247.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    37.60  DOWNSTREAM(FEET) =    35.90
 FLOW LENGTH(FEET) =   217.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.70
 PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    6.01
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    247.00 =     422.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    255.00 TO NODE    247.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.209
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       5.96
  TC(MIN.) =    6.01

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    60.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    260.00 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    230.00 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.) =    6.21
  RAINFALL INTENSITY(INCH/HR) =   4.17
  TOTAL STREAM AREA(ACRES) =     1.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.96

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.27     6.05        4.201          1.93
      2        5.96     6.21        4.171          1.49

  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       13.07     6.05       4.201
      2       13.18     6.21       4.171

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.18   Tc(MIN.) =    6.21
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.50  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =   205.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.77
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      13.18
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    6.44
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    265.00 =     688.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    265.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.127
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8853
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    0.48
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =      13.44
  TC(MIN.) =    6.44
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =      6.44
  PEAK FLOW RATE(CFS)   =      13.44
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Proposed Mitigated Condition

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
            Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                          Analysis prepared by:

                      Pasco Laret Suiter & Associates
                             119 Aberdeen Drive
                           Cardiff, California 92007
                                858-259-8212

 ************************* DESCRIPTION OF STUDY *************************
* 3272  PALM AND HOLLISTER                                               *
* PROPOSED CONDITION  MITIGATED                                          *
* 100-YR                                                                 *
 ************************************************************************

  FILE NAME: 3272PD00.DAT
  TIME/DATE OF STUDY: 11:32 04/04/2023
------------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *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   12.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  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    100.00 TO NODE    105.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    46.00
  UPSTREAM ELEVATION(FEET) =     46.50
  DOWNSTREAM ELEVATION(FEET) =     45.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.414
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.50  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    45.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.88
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =      91.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.362
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =       0.5   TOTAL RUNOFF(CFS) =       1.91
  TC(MIN.) =    5.20

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    26.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.91
```

```
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.26
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     118.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.350
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.56   SUBAREA RUNOFF(CFS) =    2.31
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.22
 TC(MIN.) =    5.26

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.00  DOWNSTREAM(FEET) =    38.00
 FLOW LENGTH(FEET) =    89.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.22
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.53
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 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.) =    5.53
 RAINFALL INTENSITY(INCH/HR) =   4.30
 TOTAL STREAM AREA(ACRES) =     1.02
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.22

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    63.00
 UPSTREAM ELEVATION(FEET) =     45.70
 DOWNSTREAM ELEVATION(FEET) =     45.50
 ELEVATION DIFFERENCE(FEET) =      0.20
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.405
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 SUBAREA RUNOFF(CFS) =      0.21
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   45.50  DOWNSTREAM ELEVATION(FEET) =   44.50
 STREET LENGTH(FEET) =    86.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
 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) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    8.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
 STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =    5.80
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.248
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
 SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    2.26
 TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.55
 FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =     149.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    40.50  DOWNSTREAM(FEET) =    38.00
 FLOW LENGTH(FEET) =    45.10   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.46
```

```
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    5.89
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =     194.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    125.00 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) =   4.23
 TOTAL STREAM AREA(ACRES) =     0.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.46

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.22     5.53        4.300          1.02
     2        2.46     5.89        4.232          0.61

 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        6.53     5.53       4.300
     2        6.61     5.89       4.232

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.61   Tc(MIN.) =    5.89
 TOTAL AREA(ACRES) =        1.6
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    125.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  15.59   RAIN INTENSITY(INCH/HOUR) =  2.85
 TOTAL AREA(ACRES) =     1.60   TOTAL RUNOFF(CFS) =      1.20

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    23.00
 FLOW LENGTH(FEET) =   294.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.20
 PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   16.29
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     501.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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.) =   16.29
  RAINFALL INTENSITY(INCH/HR) =   2.80
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.33   RAIN INTENSITY(INCH/HOUR) =  4.15
  TOTAL AREA(ACRES) =     0.28   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 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.) =    6.33
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =     0.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.52

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.20    16.29        2.797          1.60
      2        0.52     6.33        4.147          0.28

  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        0.99     6.33       4.147
      2        1.55    16.29       2.797

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.55   Tc(MIN.) =   16.29
  TOTAL AREA(ACRES) =        1.9
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =     45.70
  DOWNSTREAM ELEVATION(FEET) =     45.00
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.563
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.42
```

```
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 SUBAREA RUNOFF(CFS) =      0.42
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.63
 TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.05
 TC(MIN.) =    5.00

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    40.30  DOWNSTREAM(FEET) =    39.70
 FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.05
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.31
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     122.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.340
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.45
 TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.47
 TC(MIN.) =    5.31

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.70  DOWNSTREAM(FEET) =    39.10
```

```
  FLOW LENGTH(FEET) =    76.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.26
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.47
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    5.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =     198.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    1.55
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.99
  TC(MIN.) =    5.61

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    39.10  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =   114.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.99
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    5.98
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    222.00 =     313.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       6.77
  TC(MIN.) =    5.98

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8940
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.51
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       7.27
  TC(MIN.) =    5.98
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    34.50
 FLOW LENGTH(FEET) =    45.80   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.41
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.27
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.05
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     359.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 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.) =    6.05
 RAINFALL INTENSITY(INCH/HR) =   4.20
 TOTAL STREAM AREA(ACRES) =     1.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.27

****************************************************************************
 FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   165.00
 UPSTREAM ELEVATION(FEET) =     44.50
 DOWNSTREAM ELEVATION(FEET) =     42.00
 ELEVATION DIFFERENCE(FEET) =      2.50
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.897
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    65.15
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
 FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    37.60
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.42
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.16
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    245.00 =     204.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.369
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    1.29
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.70
  TC(MIN.) =    5.16

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    247.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.60  DOWNSTREAM(FEET) =    35.90
  FLOW LENGTH(FEET) =   217.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.70
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    247.00 =     422.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    247.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.209
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       5.96
  TC(MIN.) =    6.01

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    60.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    260.00 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    230.00 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.) =    6.21
  RAINFALL INTENSITY(INCH/HR) =   4.17
  TOTAL STREAM AREA(ACRES) =     1.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.96

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.27     6.05        4.201          1.93
      2        5.96     6.21        4.171          1.49

  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       13.07     6.05       4.201
      2       13.18     6.21       4.171

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.18   Tc(MIN.) =    6.21
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    230.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  13.61   RAIN INTENSITY(INCH/HOUR) =  3.05
  TOTAL AREA(ACRES) =     3.40   TOTAL RUNOFF(CFS) =      2.89

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.50  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =   205.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.19
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.89
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   13.95
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    265.00 =     688.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 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.) =   13.95
  RAINFALL INTENSITY(INCH/HR) =   3.02
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.89

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    265.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.44   RAIN INTENSITY(INCH/HOUR) =  4.13
  TOTAL AREA(ACRES) =     0.26   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 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.) =    6.44
  RAINFALL INTENSITY(INCH/HR) =   4.13
  TOTAL STREAM AREA(ACRES) =     0.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.48

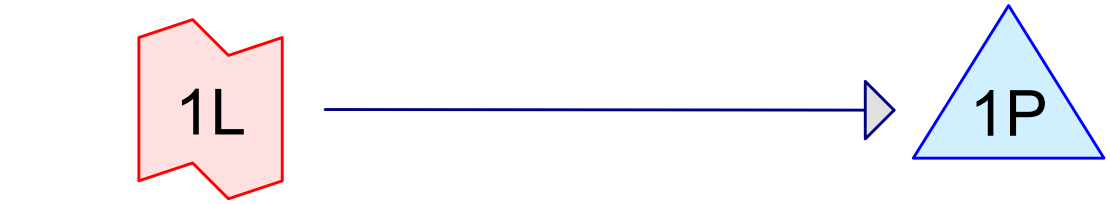
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.89    13.95        3.016          3.40
      2        0.48     6.44        4.126          0.26

  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        1.81     6.44       4.126
      2        3.24    13.95       3.016

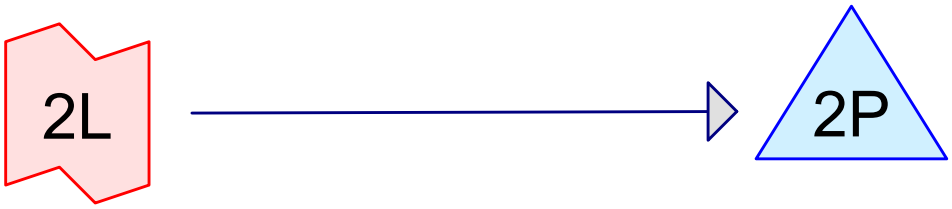
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.24   Tc(MIN.) =   13.95
  TOTAL AREA(ACRES) =        3.7
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    275.00 =     688.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =     13.95
  PEAK FLOW RATE(CFS)   =       3.24
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix 3
Detention Output



DMA-1 to VAULT-1

VAULT-1 100-YR



DMA 2 to VAULT-2

VAULT-2 100-YR

Subcat Reach Pond Link

Routing Diagram for 3272

Prepared by Pasco Laret Suiter & Assoc, Printed 4/3/2023

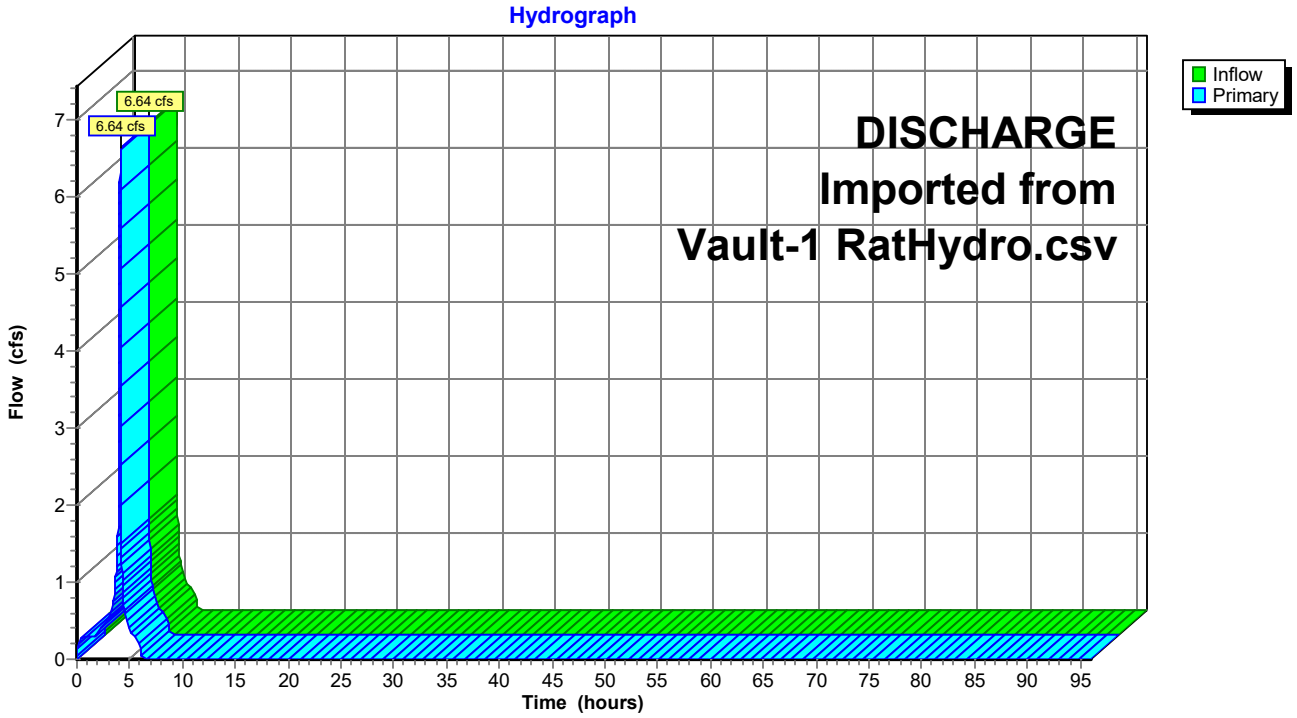
Summary for Link 1L: DMA-1 to VAULT-1

Inflow = 6.64 cfs @ 4.10 hrs, Volume= 0.327 af
Primary = 6.64 cfs @ 4.10 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : VAULT-1 100-YR

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

DISCHARGE Imported from Vault-1 RatHydro.csv

Link 1L: DMA-1 to VAULT-1



Summary for Pond 1P: VAULT-1 100-YR

Inflow	=	6.64 cfs @	4.10 hrs,	Volume=	0.327 af
Outflow	=	1.21 cfs @	4.26 hrs,	Volume=	0.327 af, Atten= 82%, Lag= 9.7 min
Discarded	=	0.00 cfs @	0.11 hrs,	Volume=	0.026 af
Primary	=	1.20 cfs @	4.26 hrs,	Volume=	0.300 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 105.28' @ 4.26 hrs Surf.Area= 1,100 sf Storage= 6,767 cf

Plug-Flow detention time= 210.8 min calculated for 0.326 af (100% of inflow)
Center-of-Mass det. time= 211.2 min (423.9 - 212.7)

Volume	Invert	Avail.Storage	Storage Description
#1	97.83'	7,192 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

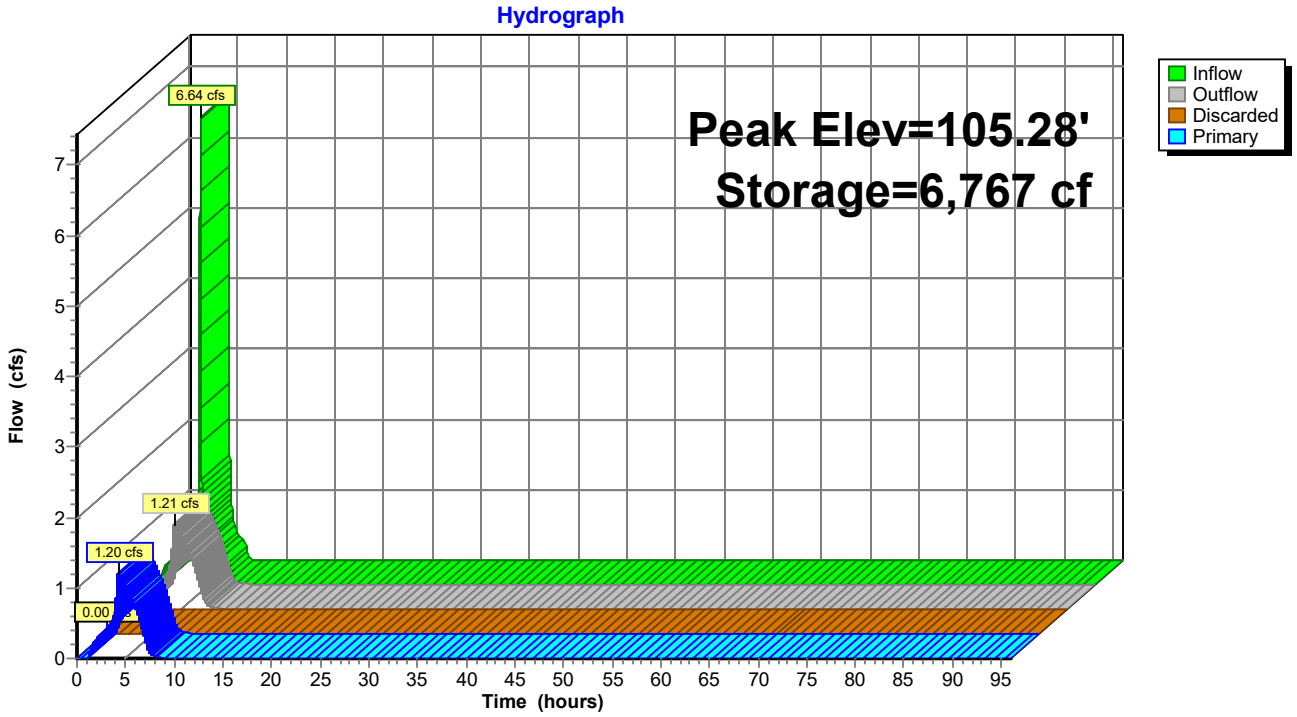
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
97.83	1,100	0.0	0	0	1,100
100.00	1,100	40.0	955	955	1,355
101.00	1,100	100.0	1,100	2,055	1,473
102.00	1,100	100.0	1,100	3,155	1,590
103.00	1,100	100.0	1,100	4,255	1,708
104.00	1,100	100.0	1,100	5,355	1,825
105.37	1,100	100.0	1,507	6,862	1,986
105.67	1,100	100.0	330	7,192	2,022

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**24.00" Round Culvert** L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 100.00' / 99.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	100.00'	**4.50" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.37'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.30 0.30 Width (feet) 14.00 14.00 0.00
#4	Discarded	97.83'	**0.180 in/hr Exfiltration over Surface area below 100.00'**

Discarded OutFlow Max=0.00 cfs @ 0.11 hrs HW=97.92' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.20 cfs @ 4.26 hrs HW=105.28' (Free Discharge)
└**1=Culvert** (Passes 1.20 cfs of 39.13 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 1.20 cfs @ 10.87 fps)
  └**3=Custom Weir** (Controls 0.00 cfs)

Pond 1P: VAULT-1 100-YR



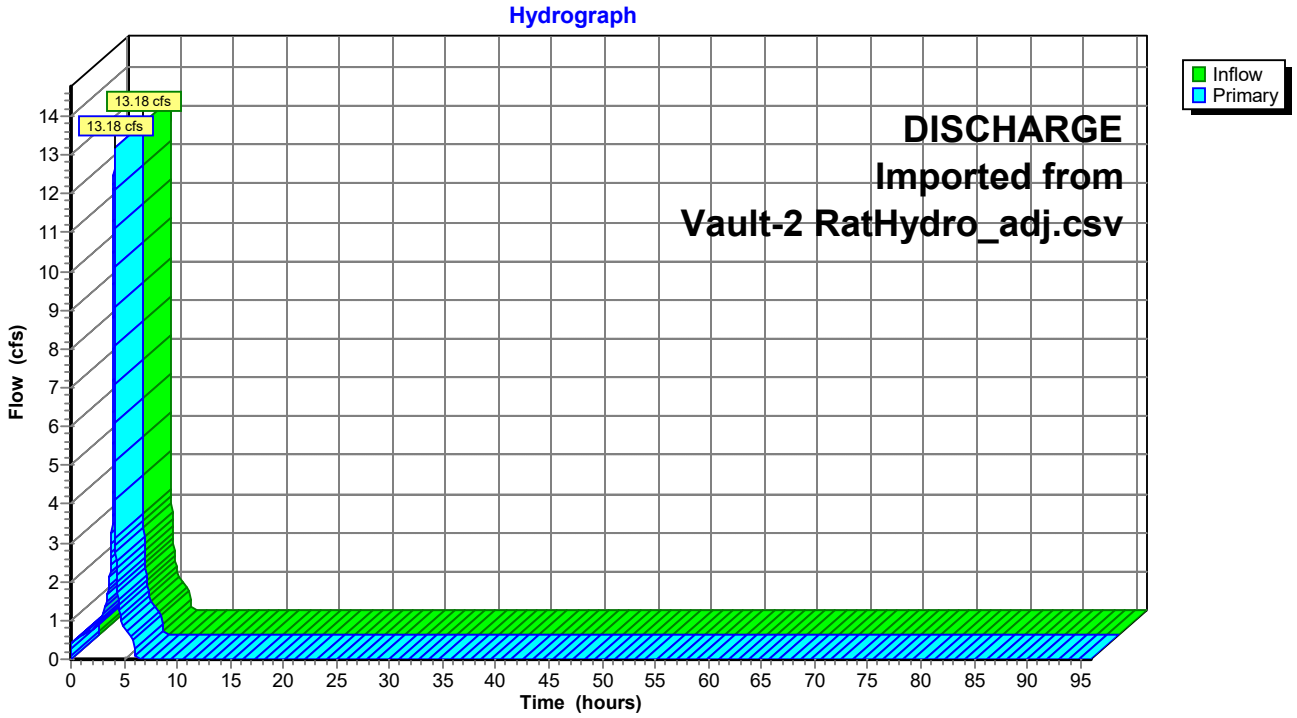
Summary for Link 2L: DMA 2 to VAULT-2

Inflow = 13.18 cfs @ 4.10 hrs, Volume= 0.694 af
Primary = 13.18 cfs @ 4.10 hrs, Volume= 0.694 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2P : VAULT-2 100-YR

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

DISCHARGE Imported from Vault-2 RatHydro_adj.csv

Link 2L: DMA 2 to VAULT-2



Summary for Pond 2P: VAULT-2 100-YR

Inflow	=	13.18 cfs @	4.10 hrs,	Volume=	0.694 af
Outflow	=	2.90 cfs @	4.22 hrs,	Volume=	0.694 af, Atten= 78%, Lag= 7.4 min
Discarded	=	0.01 cfs @	0.09 hrs,	Volume=	0.050 af
Primary	=	2.89 cfs @	4.22 hrs,	Volume=	0.644 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 105.18' @ 4.22 hrs Surf.Area= 2,300 sf Storage= 13,682 cf

Plug-Flow detention time= 176.7 min calculated for 0.694 af (100% of inflow)
Center-of-Mass det. time= 177.1 min (389.9 - 212.8)

Volume	Invert	Avail.Storage	Storage Description
#1	98.08'	14,807 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

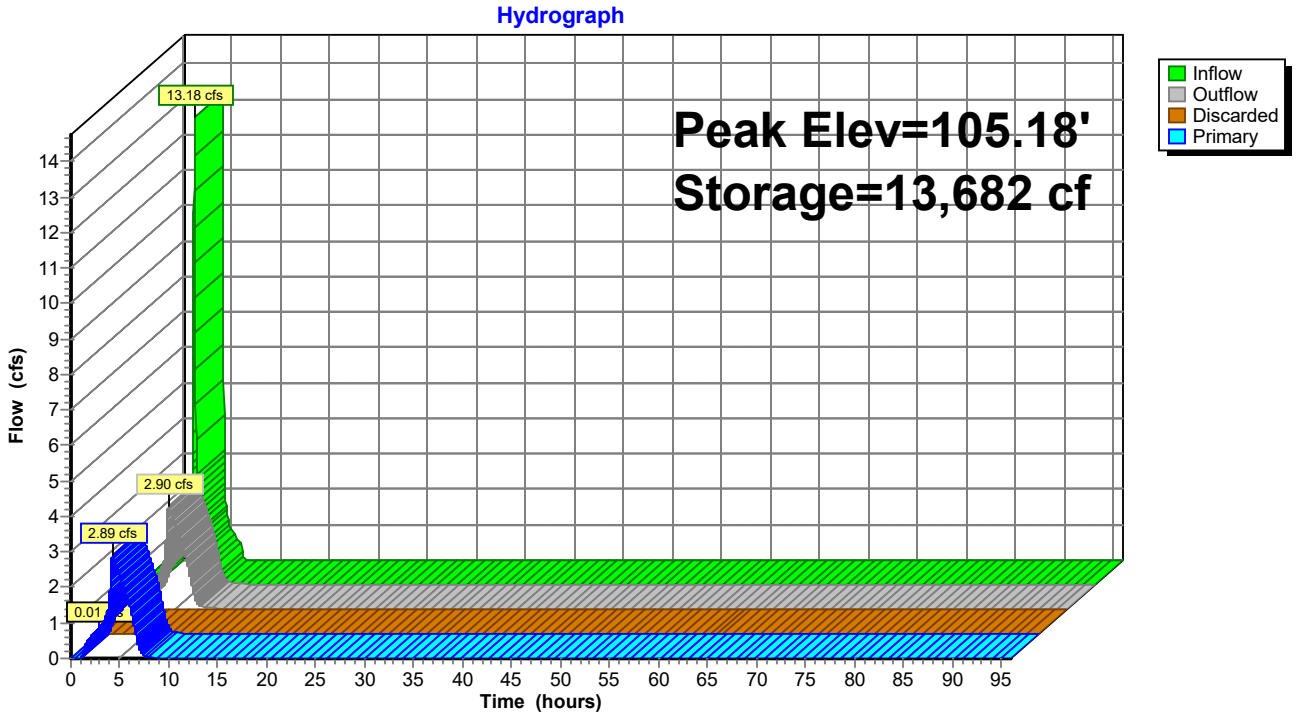
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.08	2,300	0.0	0	0	2,300
100.00	2,300	40.0	1,766	1,766	2,626
101.00	2,300	100.0	2,300	4,066	2,796
102.00	2,300	100.0	2,300	6,366	2,966
103.00	2,300	100.0	2,300	8,666	3,136
104.00	2,300	100.0	2,300	10,966	3,306
105.17	2,300	100.0	2,691	13,657	3,505
105.67	2,300	100.0	1,150	14,807	3,590

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**24.00" Round Culvert** L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 100.00' / 99.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	100.00'	**7.00" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.17'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 0.50 Width (feet) 13.00 13.00 0.00
#4	Discarded	98.08'	**0.180 in/hr Exfiltration over Surface area below 100.00'**

Discarded OutFlow Max=0.01 cfs @ 0.09 hrs HW=98.16' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

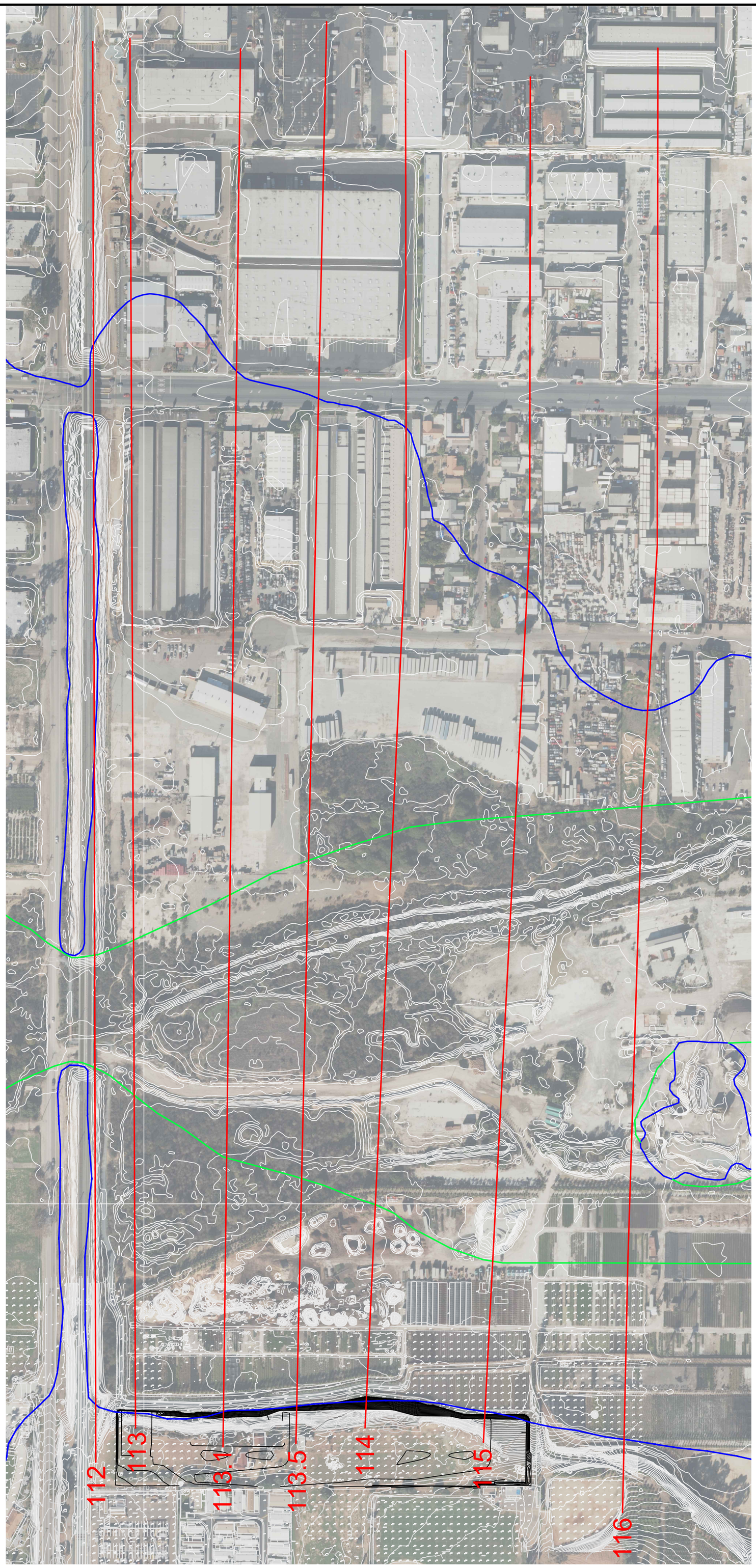
Primary OutFlow Max=2.89 cfs @ 4.22 hrs HW=105.18' (Free Discharge)
└**1=Culvert** (Passes 2.89 cfs of 38.66 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 2.85 cfs @ 10.65 fps)
  └**3=Custom Weir** (Weir Controls 0.05 cfs @ 0.34 fps)

Pond 2P: VAULT-2 100-YR



Appendix 4

100-Year HEC-RAS Output



GRAPHIC SCALE

200 0 100 200 400

1 INCH = 400 FEET

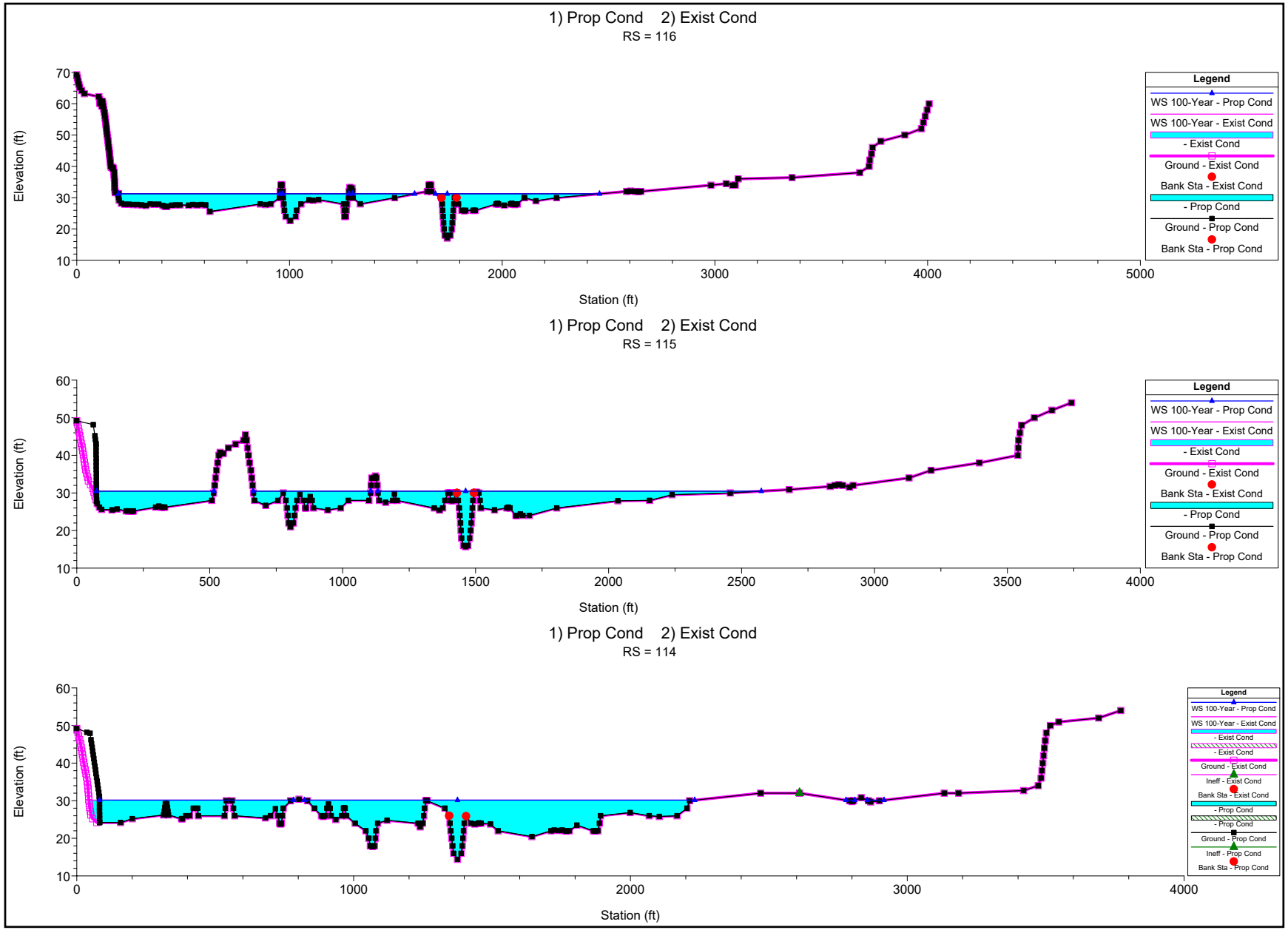
LEGEND:

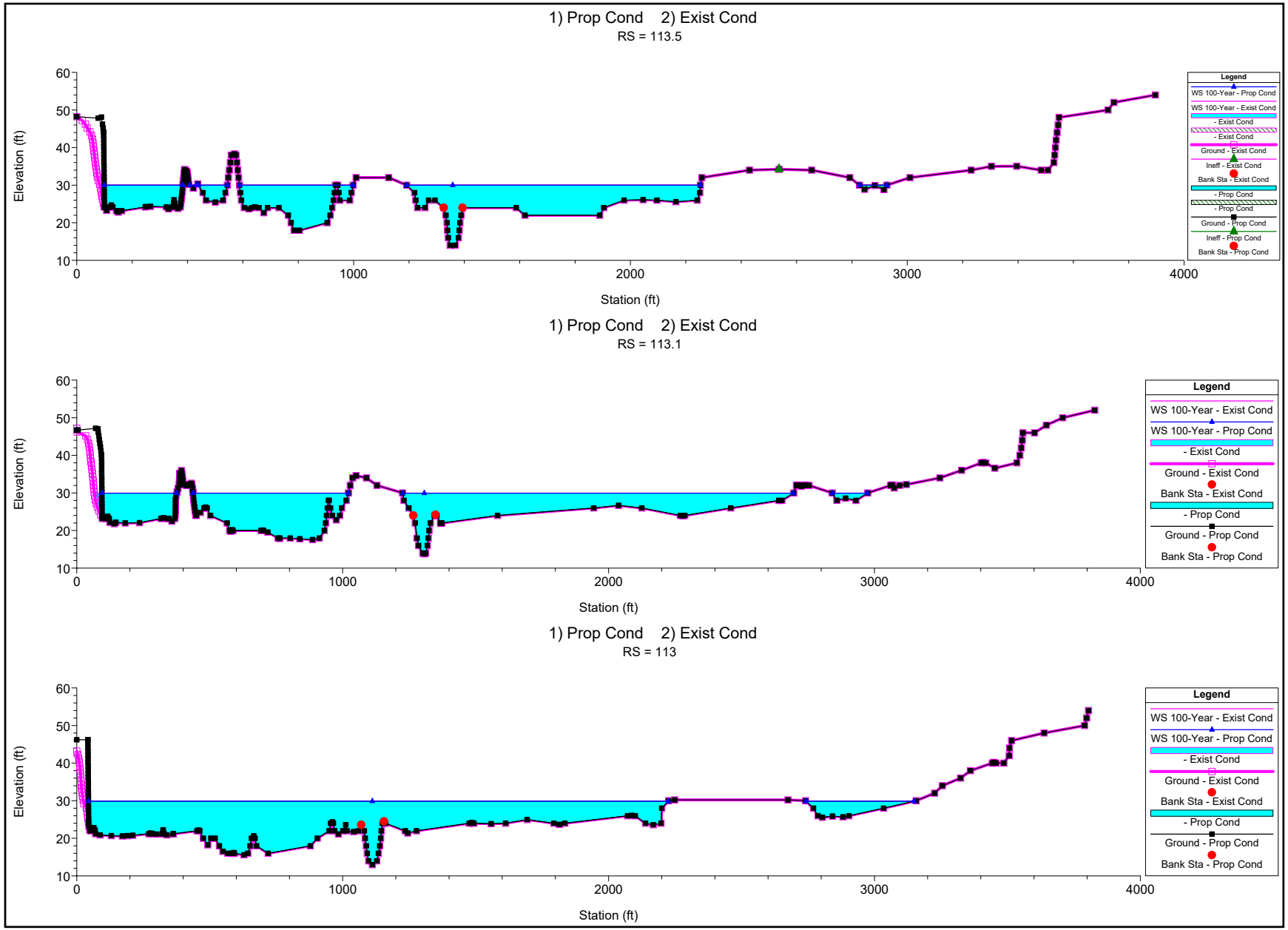
- HEC-RAS CROSS-SECTION
- PROPOSED GRADING
- EFFECTIVE 100-YEAR FLOODPLAIN
- EFFECTIVE FLOODWAY

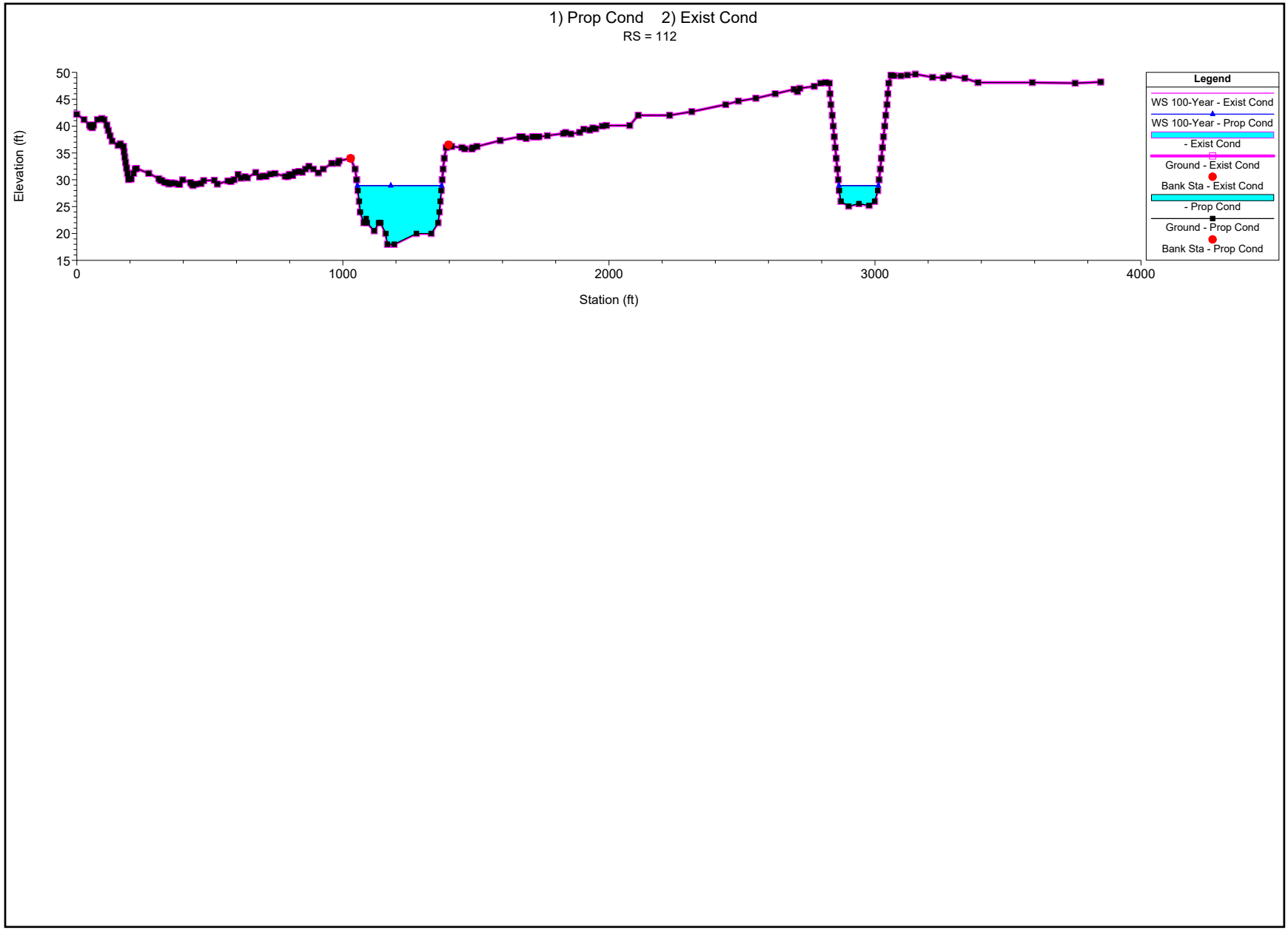
HEC-RAS WORK MAP

HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: 100-Year

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	116	100-Year	Exist Cond	22000.00	17.09	31.22		31.42	0.002518	3.98	6680.49	2129.71	0.24
Reach-1	116	100-Year	Prop Cond	22000.00	17.09	31.23		31.42	0.002504	3.97	6694.10	2131.57	0.23
Reach-1	115	100-Year	Exist Cond	22000.00	15.70	30.45		30.61	0.001965	3.67	7841.84	2332.63	0.21
Reach-1	115	100-Year	Prop Cond	22000.00	15.70	30.46		30.62	0.001947	3.66	7854.36	2325.15	0.21
Reach-1	114	100-Year	Exist Cond	22000.00	14.40	30.14	25.55	30.20	0.000711	2.54	11167.88	2241.24	0.13
Reach-1	114	100-Year	Prop Cond	22000.00	14.40	30.14	25.55	30.21	0.000739	2.59	10988.04	2204.50	0.13
Reach-1	113.5	100-Year	Exist Cond	22000.00	14.00	30.00	24.95	30.06	0.000561	2.42	11597.53	1998.52	0.12
Reach-1	113.5	100-Year	Prop Cond	22000.00	14.00	30.00	24.94	30.06	0.000564	2.43	11549.72	1982.84	0.12
Reach-1	113.1	100-Year	Exist Cond	22000.00	13.80	29.92		29.96	0.000343	1.80	14867.52	2494.45	0.09
Reach-1	113.1	100-Year	Prop Cond	22000.00	13.80	29.92		29.96	0.000347	1.81	14750.65	2465.36	0.09
Reach-1	113	100-Year	Exist Cond	22000.00	13.00	29.87		29.90	0.000162	1.30	18645.40	2605.11	0.07
Reach-1	113	100-Year	Prop Cond	22000.00	13.00	29.87		29.90	0.000161	1.29	18603.13	2586.23	0.07
Reach-1	112	100-Year	Exist Cond	22000.00	18.00	28.91	26.04	29.76	0.008928	7.63	3107.82	465.08	0.47
Reach-1	112	100-Year	Prop Cond	22000.00	18.00	28.91	26.04	29.76	0.008928	7.63	3107.82	465.08	0.47


1) Prop Cond 2) Exist Cond
RS = 116
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond
1) Prop Cond 2) Exist Cond
RS = 115
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond
1) Prop Cond 2) Exist Cond
RS = 114
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
- Exist Cond
Ground - Exist Cond
Ineff - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
- Prop Cond
Ground - Prop Cond
Ineff - Prop Cond
Bank Sta - Prop Cond


1) Prop Cond 2) Exist Cond
RS = 113.5
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
- Exist Cond
Ground - Exist Cond
Ineff - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
- Prop Cond
Ground - Prop Cond
Ineff - Prop Cond
Bank Sta - Prop Cond
1) Prop Cond 2) Exist Cond
RS = 113.1
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Exist Cond
WS 100-Year - Prop Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond
1) Prop Cond 2) Exist Cond
RS = 113
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Exist Cond
WS 100-Year - Prop Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond


1) Prop Cond 2) Exist Cond
RS = 112
Elevation (ft)
50
45
40
35
30
25
20
15
0
1000
2000
3000
4000
Station (ft)
Legend
WS 100-Year - Exist Cond
WS 100-Year - Prop Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond