DRAINAGE STUDY
FOR
SDSU MISSION VALLEY CAMPUS ADJACENT IMPROVEMENTS

(PRELIMINARY ENGINEERING)

Job Number 18150

February 12, 2019

RICK
ENGINEERING COMPANY

DRAINAGE STUDY

FOR

SDSU MISSION VALLEY CAMPUS ADJACENT IMPROVEMENTS

(PRELIMINARY ENGINEERING)

Job Number 18150

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Exp. 09/19

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February 12, 2019

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1.0 INTRODUCTION

This drainage study presents hydrologic and hydraulic analyses for the proposed adjacent improvements associated with the San Diego State University (SDSU) Mission Valley Campus Project (herein referred to as the "project"). The purpose of this report is to provide hydrologic and hydraulic support for the adjacent storm drain systems to verify the proposed adjacent and street improvements have no significant impacts to existing conditions. Off-site areas draining to the on-site storm drain systems are considered where information is available, but not analyzed at this time.

Project Location:

The project is located at 9449 Friars Road within the City of San Diego, California. A vicinity map and exhibit showing the conceptual project layout and street connections is provided in Appendix A.

Project Description and Features:

The project site is a previously developed lot that features a multi-purpose stadium (San Diego Coastal Credit Union Stadium, formerly known as Qualcomm Stadium) and adjacent parking lots over the majority of the site. The project is bounded by the Fenton Marketplace to the West of the site and Friars road to the North of the site. An industrial fuel facility is located across of San Diego Mission Road on the northwestern corner of the site. An earthen berm adjacent to Murphy Canyon Channel bounds the eastern limits of the site. The site also features a light rail station and a reach of the San Diego River along the southern boundary of the site.

The on-site project consists of demolition of the existing stadium, regrading of the site, and construction of a smaller multi-purpose stadium, campus buildings, residential and commercial developments, onsite roads, and a river park. For a detailed discussion of the onsite improvements and the associated drainage and water quality design, refer to the onsite reports titled "Drainage Study for SDSU Mission Valley" and "Water Quality Report for SDSU Mission Valley," dated January 31, 2019 and prepared by Rick Engineering Company (Job # 18150). The adjacent improvements covered by this report include connections from the onsite roads to the existing off-site roads, and the roadway improvements associated with the connections including widening and restriping.

The adjacent improvements proposed by the project, from west to east, include River Park Road, Friars Road, Mission Village Road, San Diego Mission Road, and Murphy Creek Road. These adjacent improvements will generally utilize separate storm drain systems and water quality measures than those proposed by the onsite design.

There are currently six major outfalls from the project, four that discharge south into the San Diego River and two that discharge east into the Murphy Canyon Channel. A summary of the major outfalls from the site is provided in Table 1. To minimize environmental disturbances, the

project is designed so as to maintain the existing outfall structures in the post-project condition. The improvements associated with River Park Road, portions of Mission Village Drive, and portions of Murphy Creek Road will comingle with onsite improvements and discharge south to the San Diego River. For additional analysis and discussion of the outfall design to the San Diego River, please refer to the onsite drainage study. The improvements associated with Friars Road, San Diego Mission Road, and portions of Murphy Creek Road will be conveyed by separate, existing storm drain systems to the two Murphy Canyon Channel outfalls.

Table 1 - Summary of Project Outfalls

Outfall ID	Waterbody that Receives Outfall	Onsite[1] Basin ID(s)	Adjacent and Off-site[2] Basin ID(s)
1	San Diego River	100	N/A
2	San Diego River	200	N/A
3	San Diego River	300	N/A
4	San Diego River	400	4000
6	Murphy Canyon Channel	N/A	6000
7	Murphy Canyon Channel	N/A	7000

Note 1 – Analysis included in the report titled "Drainage Study for SDSU Mission Valley," dated January 31, 2019 and prepared by Rick Engineering Company (Job # 18150) for onsite improvements
Note 2 – Analysis included in this report

For additional information and analysis of the adjacent segments of the Murphy Canyon Channel and the San Diego River, please refer to the report titled "Preliminary Floodplain Analysis for SDSU Missions Valley Campus," dated December 21, 2018 and prepared by Chang Consultants.

River Park Road is proposed to connect the existing Fenton Parkway across the light rail track and into the site where there is currently a vegetated athletic field. The proposed road consists of a standard crowned section with one through lane and on-street parking in both the eastbound and westbound directions. The northern portion of the road will be captured by the onsite storm drain system and conveyed into an onsite water quality basin, while the southern portion of the proposed will be conveyed via a separate water quality element and storm drain infrastructure within the adjacent river park. It is currently understood that the northern portion of River Park Road will be analyzed by the on-site drainage and water quality analysis, while the southern half of River Park Road will be considered as a part of the adjacent improvements. Two sidewalk underdrains are proposed to collect and convey flow from the proposed southern portion of River Park Road into the proposed biofiltration basins.

The existing condition of Friar's road generally consists of three through lanes and adjacent bike lanes in both the westbound and eastbound directions. West of the proposed Stadium Way the median of Friar's road consists of a standard crowned section with a raised median, transitioning to a striped median with intermittent modular concrete K-rail barriers until the I-15 interchange.

East of the proposed Stadium Way Friar's road transitions from standard crowned to superelevated to the south. Friars Road then becomes superelevated to the north approximately 1,000 feet west of the Mission Village Drive overpass. Intermittent slot drains and grate inlet serve to collect flows along the median along the superelevated portions of Friars Road. From the low point below the Mission Village Drive Overpass and eastward to Interstate-15 (I-15) the roadway generally returns to a standard crowned section. It is understood at this time that Friar's road will not be significantly re-graded beyond the proposed widening to the south. West of Stadium Way it is proposed that Friar's Road be widened to the south for the addition of two right turn lanes onto Stadium Way from westbound Friars. Immediately east of Stadium Way, Friars is proposed to be widened to add two left turn lanes in the west bound direction while realigning the three eastbound through lanes. The striped median with K-rail will be realigned south and in association with these proposed improvements. The four ramps connecting Friar's Road with Mission Village Drive will also be widened. The drainage pattern of Friar's Road is understood to be generally consistent between the existing and proposed conditions. Approximately 6 inlets are anticipated to be reconstructed as a result of the proposed improvements. Approximately 7 additional inlets are not proposed to be re-constructed but are planned to be analyzed for capacity due to proposed developments in the contributing drainage area.

The existing condition of Mission Village Drive consists of two through lanes in both the northbound and southbound directions, and single lanes onto the Friars Road ramps, north and south of the overpass over Friars Road. The through lanes will be maintained by the proposed condition. The road and overpass are proposed to be widened to add bike lanes in the north and southbound directions and to incorporate dual turn lanes onto the widened eastbound and westbound Friars Road on-ramps. One existing inlet is anticipated to be reconstructed as a result of the proposed improvements. No additional inlets are proposed to be impacted or reconstructed by these project improvements. The majority of runoff from the southbound lanes of Mission Village Drive flow directly into the onsite project area, while the majority of runoff from the north bound lanes is conveyed by San Diego Mission Road.

In the existing condition San Diego Mission Road generally consists of two through lanes in both the eastbound and westbound directions. An existing private driveway to the fuel facility is connected to this road, and San Diego Mission Road continues eastward, crossing Murphy Canyon Creek and I-15 via an overpass. In the proposed condition, the two westbound lanes between Mission Village Drive and the fuel facility are understood to be protected in place and converted to an extended private driveway for the fuel facility. The two eastbound lanes in this segment will be removed and incorporated into the onsite improvements. Beginning at the fuel facility, a portion of San Diego Mission Road will be realigned to connect south to the proposed onsite roads via a traffic circle. The remaining portion to the east of the Fuel Facility will generally be protected in place. Two inlets are anticipated to be reconstructed as a result of the proposed improvements and a new inlet is understood to be proposed to capture and convey flow from the proposed Fuel Facility Driveway.

Murphy Creek Road is proposed where there is currently a perimeter access road and existing parking. The access road connects to Rancho Mission Road at the southeast corner of the site via an overpass over the Murphy Canyon Channel and an underpass beneath I-15. An existing earthen berm along the eastern perimeter of the site, serving as a bank of the Murphy Canyon Channel, is understood to not be impacted by the proposed improvements. The existing southeast section of Murphy Creek Road is superelevated to the east and also understood to be protected in place. The proposed section of Murphy Creek Road along the eastern perimeter of the site is superelevated to the west. The proposed road section will consist of one through lane in both directions and on-street parking along the southbound lane. Two inlets are proposed along the western superelevated portion of Murphy Creek Road, and the existing inlet on the southern portion of Murphy Creek Road is understood to be maintained. While the majority of the proposed developments for Murphy Creek Road are anticipated to remain within the 100-year flood plain, it is understood that analysis of inlet capacity and spread width should still be performed for these improvements.

A summary of the existing and proposed inlets associated with the adjacent project improvements is provided in the Hydraulics Section of this report.

Water Quality:

Post-project storm water runoff from adjacent improvements will be treated in accordance with the City of San Diego Storm Water Standards Manual (October 2018), and will be discussed in the letter report titled, "Green Streets Elements for SDSU Mission Valley Campus Adjacent Improvements," dated January 31, 2019, or subsequent versions thereof, prepared by Rick Engineering Company (Job No. 18150). In pursuing a Green Street Approach, the adjacent project improvements will be exempt from Priority Development Project (PDP) designation, per PDP Exemption Category 2 as stated in Appendix J of the City of San Diego's Storm Water Standards. As such, a Priority Development Project Storm Water Quality Management Plan (PDP SWQMP), and a Hydromodification Plan are not required.

Adjacent improvements that are collected and treated by onsite basins will be treated to the standard determined for the onsite development, and discussed in the report titled "Water Quality Report for SDSU Mission Valley Campus," dated January 31, 2019, or subsequent versions thereof, prepared by Rick Engineering Company (Job No. 18150).

FEMA Flood Zone Information:

The project site is within a FEMA 100-year flood plain "Zone A" along the eastern and southern perimeter of the site. The site is proposed to be developed so as to maintain a minimum pad freeboard of two feet above the floodplain WSE. The river park and a portion of Murphy Creek Road are proposed to be within the 100-year flood plain. It is anticipated that a LOMR/CLOMR will be required for the project as a whole. The LOMR/CLOMR preparation and processing will be performed by others and is not included in this report.

2.0 HYDROLOGY

Hydrologic Methodology and Criteria:

The 100-year 6-hour post-project peak flow rates were determined for the proposed drainage systems using the Modified Rational Method. Drainage basins associated with the adjacent improvements have been analyzed for the project. Off-site drainage basins have not been analyzed with this study as drainage analysis and as-builts and for these areas are not entirely available at this time. There are approximately 6 locations identified with nodes IDs on the Drainage Exhibits included with Map Pockets 1 and 2 where it is anticipated that off-site flows enter and are conveyed through the project area.

Without off-site flow information the impact of the proposed improvements may not be fully quantified. The current design approach is to calculate the routing of flows collected within the project area in the pre-project and post-project condition. It is anticipated that this approach will indicate a more significant change in peak flow rate as a result of the project than may realistically be expected, as the results will not account for the greater times of concentration that are anticipated for the offsite basin areas. It is understood that this design approach is sufficiently conservative at this stage of the project.

Modified Rational Method Methodology and Criteria:

The City of San Diego's *Drainage Design Manual* requires that the Modified Rational Method be used for hydrologic analysis of a watershed less than 0.5 square miles. The project site and off-site drainage areas tributary to each of the drainage systems total less than 0.5 square miles. The Modified Rational Method computer program developed by Advanced Engineering Software (AES) was used for this study and satisfies the City of San Diego's design criteria.

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

Subarea Hydrologic Processes (Codes)

Code	1:	Confluence analysis at a node
Code	2:	Initial subarea analysis
Code	3:	Pipe flow travel time (computer-estimated pipe sizes)
Code	4:	Pipe flow travel time (user-specified pipe size)
Code	5:	Trapezoidal channel travel time
Code	6:	Street flow analysis through a subarea
Code	7:	User-specified information at a node
Code	8:	Addition of the subarea runoff to mainline

Code	9:	V-Gutter flow through subarea
Code	10:	Copy mainstream data onto a memory bank
Code	11:	Confluence a memory bank with the mainstream memory
Code	12:	Clear a memory bank
Code	13:	Clear the mainstream memory
Code	14:	Copy a memory bank onto the mainstream memory
Code	15:	Hydrologic data bank storage functions

In order to perform the hydrologic analysis, base information for the study area is required. This information includes land uses, drainage facility locations, flow patterns, drainage basin boundaries, and topographic elevations. This information was determined from drainage study maps presented in Map Pockets 1 and 2. The attached exhibits reflect two sources for the topographic information: (1) - the first was generated by photogrammetric methods from information gathered on March 28, 2014 by Rick Engineering Company; (2) – the second was 2-foot contours generated from SanGIS digital terrain model (DTM) coverage. The second source was utilized to help determine the off-site drainage boundaries contributing flow to the adjacent and on-site storm drain systems.

The hydrologic conditions were analyzed in accordance with the City of San Diego's design criteria. A summary of the criteria used is as follows:

Design Storm:	100-year 6-hour
Runoff Coefficients:	
Road (hard surface)	C = 0.95
Undeveloped (vegetated)	C = 0.45
Soil Type:	"D"
Rainfall Intensity:	Based on time-intensity criteria presented in the City of San Diego's *Drainage Design Manual* dated January 2017

Modified Rational Method Results:

The results of the modified rational method analyses are provided in Appendix B of this report.

The map titled, "Drainage Study Map SDSU Mission Valley Campus Adjacent Improvements – Existing Condition" present the drainage area boundaries for each of the project adjacent drainage basins and are located in Map Pocket 1.

The map titled, "Drainage Study Map SDSU Mission Valley Campus Adjacent Improvements – Proposed Condition" present the drainage area boundaries for each of the project adjacent drainage basins and are located in Map Pocket 2.

Table 2.1 presents a summary of the Modified Rational Method analyses for the adjacent and off-site drainage basins. As previously discussed, this analysis does not account for the larger areas and anticipated times of concentration associated with offsite areas. The changes in peak flow rates presented by Table 2.1 are not anticipated to be as significant when offsite areas are included with the analysis conducted for final engineering.

Table 2.1
Summary of 100-Year 6-Hour Peak Discharge Rates

Basin ID	Outfall Location/Node Number (Pre-Project)	Outfall Location/Node Number (Post-Project)	Area (acres)		Time of Concentration (minutes)		100-Year 6-Hour Peak Flow Rate (cfs)[1]	
			Pre-Project	Post-Project	Pre-Project	Post-Project	Pre-Project	Post-Project
1000*	1000	1000	Offsite area – Values not available at this time					
4000**	4002	4005	0.1	1.2	6.0	14.7	0.4	3.5
5000**	5010	5010	1.4	1.4	9.8	9.8	4.1	4.2
6000**	6095	6095	25.8	27.4	13.9	13.8	67.0	72.9
7000**	7005	7005	0.2	0.2	7.1	7.1	0.8	0.8

Note 1 - cfs = cubic feet per second

* Entirely offsite area, not analyzed at this time

** Values represent the combination of offsite and adjacent watersheds

3.0 HYDRAULICS

Hydraulic Methodology and Criteria:

The 100-year 6-hour undetained peak flow rates determined using the Modified Rational Method were used for preliminary sizing of drainage structures. The AES Pipe Flow Hydraulics computer program will be used to calculate the HGLs during final engineering. The 100-year 6-hour undetained peak flow rates determined using the Modified Rational Method will also be used during final engineering to determine inlet sizes for inlets proposed for the project site.

Pipe Flow Methodology and Criteria:

The AES Pipe Flow Hydraulics computer program will be used to calculate the hydraulic grade lines during final engineering.

Inlet Design Methodology and Criteria:

Proposed inlets will be sized for the 100-year 6-hour storm event. During final engineering, inlets will be designed to intercept all flows and not to allow inlet bypass to downstream drainage areas. Inlets will be sized per the City of San Diego Drainage Design Manual, dated January 2017.

Energy Dissipater Design:

Riprap for energy dissipater is shown at all outfall locations. The riprap size for energy dissipation at each proposed storm drain outfall will be specified during final design using the City of San Diego - Standard Drawing Supplemental to Regional Standard Drawing ("D" Series) drawing number SDD-104 (SDD-104), which provides rock classifications for design velocities for riprap sections

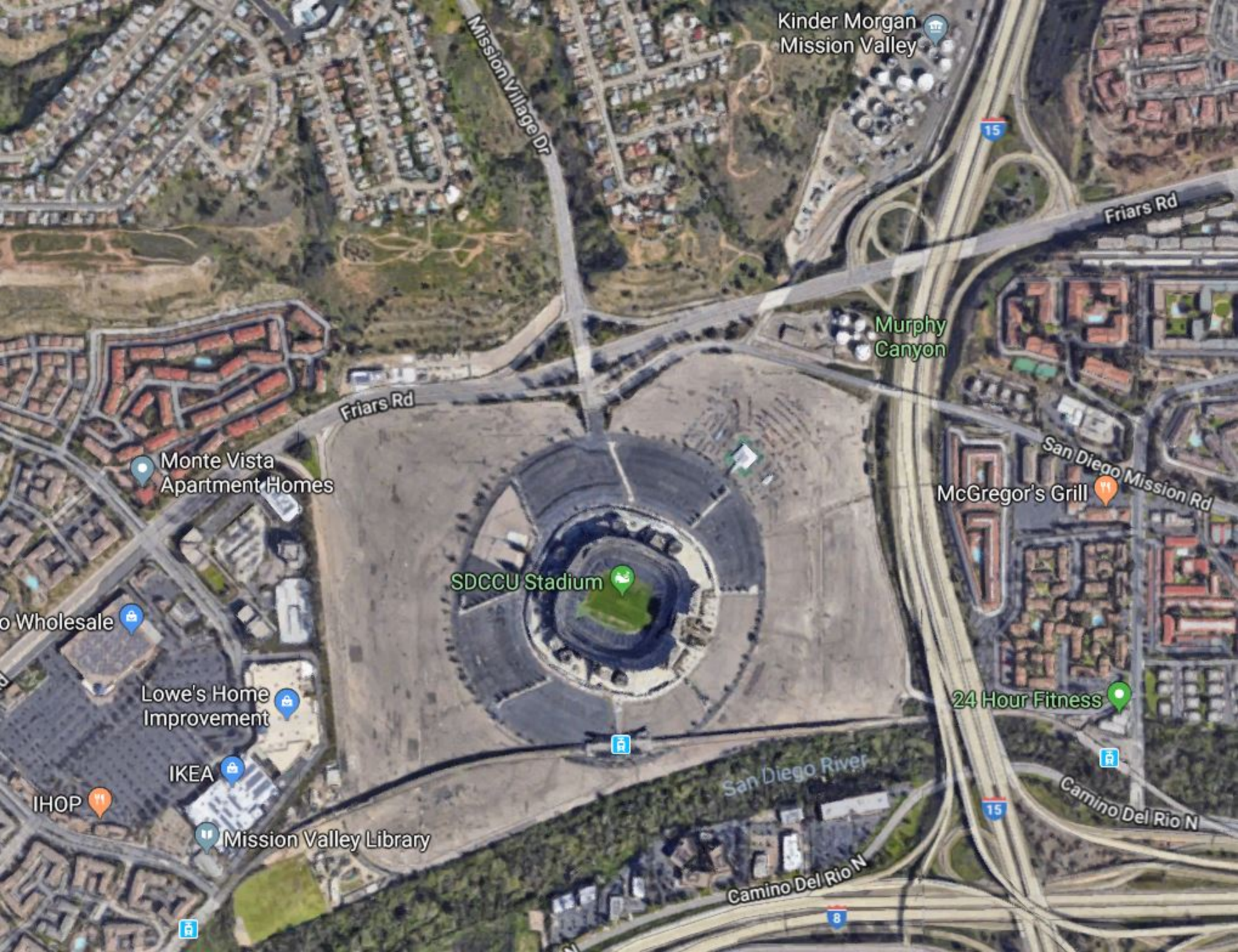
4.0 CONCLUSION

This drainage study presents hydrologic and hydraulic analyses for the proposed adjacent improvements associated with the SDSU Mission Valley West Campus project. The purpose of this report is to provide hydrologic and hydraulic support for the adjacent storm drain systems to verify the proposed improvements have no significant impacts to existing conditions. The adjacent roadway improvements associated with the project will require some additional inlets to be installed, and others to be relocated or reinstalled.

The 100-year 6-hour peak flow rates were calculated using the Modified Rational Method computer program. The project impacts to the existing storm drain systems are anticipated to be minimal, though as off-site flow information is not available at this time the impact of the proposed improvements may not be fully quantified.

APPENDIX A

Project Vicinity Map and Conceptual Project Layout


Kinder Morgan
Mission Valley
Mission Village Dr
15
Friars Rd
Murphy
Canyon
Friars Rd
Monte Vista
Apartment Homes
San Diego Mission Rd
McGregor's Grill
SDCCU Stadium
o Wholesale
Lowe's Home
Improvement
24 Hour Fitness
IKEA
San Diego River
IHOP
Camino Del Rio N
Mission Valley Library
15
Camino Del Rio N
8

SDSU Mission Valley Campus
Site Plan Date: 12/18/2018

NOT TO SCALE

J-18150

APPENDIX B

100-Year, 6-Hour Modified Rational Method Analyses
for Pre- and Post-project Condition

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 4000 - 100-YAER, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S4000E00.RAT
  TIME/DATE OF STUDY: 15:02 01/25/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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.*

+------------------------------------------------------------------------+
| OFF-SITE FLOW ANTICIPATED AT THIS LOCATION                             |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4002.00 IS CODE =  21
```

```
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  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =     63.00
  DOWNSTREAM ELEVATION(FEET) =     52.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.555
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.10  TC(MIN.) =      6.00
  PEAK FLOW RATE(CFS)   =      0.37
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 5000 - 100-YEAR, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S5000E00.RAT
  TIME/DATE OF STUDY: 14:06 01/25/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   5000.00 TO NODE   5002.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
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  INITIAL SUBAREA FLOW-LENGTH(FEET) =    92.00
  UPSTREAM ELEVATION(FEET) =    116.00
  DOWNSTREAM ELEVATION(FEET) =    115.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.870
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
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----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  115.00  DOWNSTREAM ELEVATION(FEET) =   90.00
  STREET LENGTH(FEET) =   772.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 48.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  43.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
  STREET FLOW TRAVEL TIME(MIN.) =   3.83   Tc(MIN.) =   9.83
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.483
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.80
  TOTAL AREA(ACRES) =      1.40        PEAK FLOW RATE(CFS) =       4.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.25
  FLOW VELOCITY(FEET/SEC.) =  3.89   DEPTH*VELOCITY(FT*FT/SEC.) =   1.22
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5010.00 =   864.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      1.40  TC(MIN.) =      9.83
  PEAK FLOW RATE(CFS)   =      4.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 6000 - 100-YAER, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S6000E00.RAT
  TIME/DATE OF STUDY: 15:41 01/25/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   6000.00 TO NODE   6002.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7300
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
 UPSTREAM ELEVATION(FEET) =    120.00
 DOWNSTREAM ELEVATION(FEET) =    116.00
 ELEVATION DIFFERENCE(FEET) =      4.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.161
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.31
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
 FLOW PROCESS FROM NODE   6002.00 TO NODE   6005.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  116.00  DOWNSTREAM ELEVATION(FEET) =  106.00
 STREET LENGTH(FEET) =   426.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 48.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  43.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.39
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   8.55
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.726
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.79
 TOTAL AREA(ACRES) =      1.20        PEAK FLOW RATE(CFS) =       3.09

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.75
 FLOW VELOCITY(FEET/SEC.) =  3.17   DEPTH*VELOCITY(FT*FT/SEC.) =   0.97
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =   525.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6005.00 TO NODE   6010.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    98.00  DOWNSTREAM(FEET) =    83.00
 FLOW LENGTH(FEET) =   519.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.43
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.09
 PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =   9.71
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6010.00 =  1044.00 FEET.
```

```
+----------------------------------------------------------------------------+
| OFF-SITE FLOWS ANTICIPATED AT THIS LOCATION FROM MAINLINE                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.505
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.67
  TOTAL AREA(ACRES) =      1.40   TOTAL RUNOFF(CFS) =    3.76
  TC(MIN.) =   9.71

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6015.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    83.00  DOWNSTREAM(FEET) =    78.00
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.76
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =  10.38
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6015.00 =  1314.00 FEET.

+----------------------------------------------------------------------------+
| OFF-SITE FLOW ANTICIPATED AT THIS LOCATION FROM NODE 6006                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   6015.00 TO NODE   6015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.408
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.70   SUBAREA RUNOFF(CFS) =    4.34
  TOTAL AREA(ACRES) =      3.10   TOTAL RUNOFF(CFS) =    8.11
  TC(MIN.) =  10.38

****************************************************************************
  FLOW PROCESS FROM NODE   6015.00 TO NODE   6020.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.00  DOWNSTREAM(FEET) =    77.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      8.11
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  10.48
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6020.00 =  1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6020.00 TO NODE   6020.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.397
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.90
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   11.01
 TC(MIN.) =  10.48

****************************************************************************
 FLOW PROCESS FROM NODE   6020.00 TO NODE   6025.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    77.00  DOWNSTREAM(FEET) =    75.00
 FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.35
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     11.01
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  10.88
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6025.00 =  1539.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6025.00 TO NODE   6025.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.353
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.32
 TOTAL AREA(ACRES) =      4.10   TOTAL RUNOFF(CFS) =   11.33
 TC(MIN.) =  10.88

****************************************************************************
 FLOW PROCESS FROM NODE   6025.00 TO NODE   6025.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.353
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.64
 TOTAL AREA(ACRES) =      4.30   TOTAL RUNOFF(CFS) =   11.97
 TC(MIN.) =  10.88

****************************************************************************
 FLOW PROCESS FROM NODE   6025.00 TO NODE   6040.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    74.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.84
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.97
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  11.36
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6040.00 =  1709.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6040.00 TO NODE   6040.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.36
  RAINFALL INTENSITY(INCH/HR) =   3.30
  TOTAL STREAM AREA(ACRES) =     4.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.97

****************************************************************************
  FLOW PROCESS FROM NODE   6030.00 TO NODE   6032.00 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) =    98.00
  UPSTREAM ELEVATION(FEET) =    133.00
  DOWNSTREAM ELEVATION(FEET) =    122.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.194
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   6032.00 TO NODE   6035.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  122.00  DOWNSTREAM ELEVATION(FEET) =   75.00
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   2.79   Tc(MIN.) =   8.79
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.680
```

```
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8900
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.62
 TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       3.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.55
 FLOW VELOCITY(FEET/SEC.) =  4.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.26
 LONGEST FLOWPATH FROM NODE   6030.00 TO NODE   6035.00 =   809.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6035.00 TO NODE   6035.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.680
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    5.40   SUBAREA RUNOFF(CFS) =   15.90
 TOTAL AREA(ACRES) =      6.30   TOTAL RUNOFF(CFS) =   18.92
 TC(MIN.) =   8.79

****************************************************************************
 FLOW PROCESS FROM NODE   6035.00 TO NODE   6040.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    74.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.89
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     18.92
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   9.00
 LONGEST FLOWPATH FROM NODE   6030.00 TO NODE   6040.00 =   909.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6040.00 TO NODE   6040.00 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.) =   9.00
 RAINFALL INTENSITY(INCH/HR) =   3.64
 TOTAL STREAM AREA(ACRES) =     6.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.92

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.97    11.36        3.300          4.30
     2       18.92     9.00        3.640          6.30

 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       29.77     9.00       3.640
     2       29.12    11.36       3.300
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     29.77   Tc(MIN.) =    9.00
  TOTAL AREA(ACRES) =     10.60
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6040.00 =  1709.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6040.00 TO NODE   6040.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.640
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.73
  TOTAL AREA(ACRES) =     11.10   TOTAL RUNOFF(CFS) =   31.49
  TC(MIN.) =   9.00

****************************************************************************
  FLOW PROCESS FROM NODE   6040.00 TO NODE   6045.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    74.00  DOWNSTREAM(FEET) =    70.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.39
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     31.49
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   9.22
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6045.00 =  1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6045.00 TO NODE   6045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.598
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =     11.30   TOTAL RUNOFF(CFS) =   32.18
  TC(MIN.) =   9.22

****************************************************************************
  FLOW PROCESS FROM NODE   6045.00 TO NODE   6045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.598
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =     11.50   TOTAL RUNOFF(CFS) =   32.86
  TC(MIN.) =   9.22

****************************************************************************
  FLOW PROCESS FROM NODE   6045.00 TO NODE   6060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    70.00  DOWNSTREAM(FEET) =    62.00
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.93
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     32.86
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   9.53
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6060.00 =  2129.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6060.00 TO NODE   6060.00 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.) =   9.53
  RAINFALL INTENSITY(INCH/HR) =   3.54
  TOTAL STREAM AREA(ACRES) =    11.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.86

****************************************************************************
  FLOW PROCESS FROM NODE   6050.00 TO NODE   6052.00 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) =    72.00
  UPSTREAM ELEVATION(FEET) =    104.00
  DOWNSTREAM ELEVATION(FEET) =    101.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.424
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   6053.00 TO NODE   6053.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  101.00  DOWNSTREAM ELEVATION(FEET) =   90.00
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 46.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  41.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   3.48   Tc(MIN.) =   9.48
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.549
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.69
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   8.32
  FLOW VELOCITY(FEET/SEC.) =  2.80   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6053.00 =   594.00 FEET.

+-------------------------------------------------------------------------+
| OFF-SITE FLOWS ANTICIPATED AT THIS LOCATION FROM BROW DITCH              |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   6053.00 TO NODE   6054.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   90.00  DOWNSTREAM ELEVATION(FEET) =   83.00
  STREET LENGTH(FEET) =   317.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 46.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  41.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.28
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   1.74   Tc(MIN.) =  11.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.316
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.26
  TOTAL AREA(ACRES) =      1.00        PEAK FLOW RATE(CFS) =       3.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.17
  FLOW VELOCITY(FEET/SEC.) =  3.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6054.00 =   911.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6054.00 TO NODE   6054.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.316
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    3.25
  TOTAL AREA(ACRES) =      2.40   TOTAL RUNOFF(CFS) =    6.59
  TC(MIN.) =  11.22

****************************************************************************
  FLOW PROCESS FROM NODE   6054.00 TO NODE   6055.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    83.00  DOWNSTREAM(FEET) =    74.00
  FLOW LENGTH(FEET) =   710.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.59
  PIPE TRAVEL TIME(MIN.) =   1.76    Tc(MIN.) =  12.98
  LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6055.00 =  1621.00 FEET.

+--------------------------------------------------------------------------+
| OFF-SITE FLOWS ANTICIPATED AT THIS LOCATION FROM MAINLINE                 |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   6055.00 TO NODE   6055.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.122
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    3.04
  TOTAL AREA(ACRES) =      3.90   TOTAL RUNOFF(CFS) =    9.64
  TC(MIN.) =  12.98

****************************************************************************
  FLOW PROCESS FROM NODE   6055.00 TO NODE   6055.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.122
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    2.90
  TOTAL AREA(ACRES) =      5.40   TOTAL RUNOFF(CFS) =   12.54
  TC(MIN.) =  12.98

****************************************************************************
  FLOW PROCESS FROM NODE   6055.00 TO NODE   6057.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    72.00  DOWNSTREAM(FEET) =    67.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.25
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.54
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  13.10
```

```
 LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6057.00 =  1721.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6057.00 TO NODE   6057.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.109
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.31
 TOTAL AREA(ACRES) =      6.00   TOTAL RUNOFF(CFS) =   13.85
 TC(MIN.) =  13.10

****************************************************************************
 FLOW PROCESS FROM NODE   6057.00 TO NODE   6057.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.109
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .7900
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.47
 TOTAL AREA(ACRES) =      6.60   TOTAL RUNOFF(CFS) =   15.32
 TC(MIN.) =  13.10

****************************************************************************
 FLOW PROCESS FROM NODE   6057.00 TO NODE   6060.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    67.00  DOWNSTREAM(FEET) =    62.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     15.32
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  13.22
 LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6060.00 =  1821.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6060.00 TO NODE   6060.00 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.) =  13.22
 RAINFALL INTENSITY(INCH/HR) =   3.10
 TOTAL STREAM AREA(ACRES) =     6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.32

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       32.86     9.53        3.540         11.50
     2       15.32    13.22        3.095          6.60

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

 ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	46.26	9.53	3.540
2	44.06	13.22	3.095

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 46.26 Tc(MIN.) = 9.53
TOTAL AREA(ACRES) = 18.10
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6060.00 = 2129.00 FEET.

****
FLOW PROCESS FROM NODE 6060.00 TO NODE 6065.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 62.00 DOWNSTREAM(FEET) = 61.00
FLOW LENGTH(FEET) = 370.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.00
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 46.26
PIPE TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 10.55
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6065.00 = 2499.00 FEET.

****
FLOW PROCESS FROM NODE 6065.00 TO NODE 6065.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.389
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 5.49
TOTAL AREA(ACRES) = 19.90 TOTAL RUNOFF(CFS) = 51.75
TC(MIN.) = 10.55

****
FLOW PROCESS FROM NODE 6065.00 TO NODE 6070.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 61.00 DOWNSTREAM(FEET) = 59.00
FLOW LENGTH(FEET) = 625.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 32.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.55
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 51.75
PIPE TRAVEL TIME(MIN.) = 1.59 Tc(MIN.) = 12.15
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6070.00 = 3124.00 FEET.

****
FLOW PROCESS FROM NODE 6070.00 TO NODE 6070.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.214
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .7700
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) = 4.80 SUBAREA RUNOFF(CFS) = 11.88
TOTAL AREA(ACRES) = 24.70 TOTAL RUNOFF(CFS) = 63.63
TC(MIN.) = 12.15

```
**************************************************************************
  FLOW PROCESS FROM NODE   6070.00 TO NODE   6070.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.214
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =     25.80   TOTAL RUNOFF(CFS) =   66.99
  TC(MIN.) =  12.15

**************************************************************************
  FLOW PROCESS FROM NODE   6070.00 TO NODE   6095.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.00  DOWNSTREAM(FEET) =    57.00
  FLOW LENGTH(FEET) =   700.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     66.99
  PIPE TRAVEL TIME(MIN.) =   1.73    Tc(MIN.) =  13.88
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6095.00 =  3824.00 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     25.80  TC(MIN.) =     13.88
  PEAK FLOW RATE(CFS)   =     66.99
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 7000 - 100-YEAR, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S7000E00.RAT
  TIME/DATE OF STUDY: 14:09 01/25/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   7000.00 TO NODE   7002.00 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) =    78.00
  UPSTREAM ELEVATION(FEET) =     65.00
  DOWNSTREAM ELEVATION(FEET) =     64.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.195
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   7002.00 TO NODE   7005.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   59.00
  STREET LENGTH(FEET) =   176.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   7.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.997
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.40
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7005.00 =   254.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.20  TC(MIN.) =      7.12
  PEAK FLOW RATE(CFS)   =      0.78
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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

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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 4000 - 100-YAER, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S4000P00.RAT
  TIME/DATE OF STUDY: 17:00 01/28/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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.*

+-------------------------------------------------------------------------+
| OFF-SITE FLOW ANTICIPATED AT THIS LOCATION                              |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4002.00 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) =    61.00
  UPSTREAM ELEVATION(FEET) =     63.00
  DOWNSTREAM ELEVATION(FEET) =     62.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.788
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

********************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4005.00 IS CODE =  61
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =   62.00  DOWNSTREAM ELEVATION(FEET) =   58.00
  STREET LENGTH(FEET) =   782.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 23.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  18.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
  STREET FLOW TRAVEL TIME(MIN.) =   8.68   Tc(MIN.) =  14.68
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.936
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.23
  TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.56
  FLOW VELOCITY(FEET/SEC.) =  1.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4005.00 =   843.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   4005.00 TO NODE   4005.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.936
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.84
  TOTAL AREA(ACRES) =      1.20   TOTAL RUNOFF(CFS) =    3.47
  TC(MIN.) =  14.68
```

```
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      1.20  TC(MIN.) =     14.68
  PEAK FLOW RATE(CFS)   =      3.47
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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****************************************************************************

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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* SDSU MISSION VALLEY                                                     *
* BASIN 5000 - 100-YEAR, 6-HR STORM EVENT                                 *
* JN-18150                                                                *
 *************************************************************************

  FILE NAME: S5000P00.RAT
  TIME/DATE OF STUDY: 16:48 01/28/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   5000.00 TO NODE   5002.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    92.00
  UPSTREAM ELEVATION(FEET) =    116.00
  DOWNSTREAM ELEVATION(FEET) =    115.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.366
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5010.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  115.00  DOWNSTREAM ELEVATION(FEET) =   90.00
  STREET LENGTH(FEET) =   772.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 48.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  43.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   3.79   Tc(MIN.) =   9.79
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.489
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.81
  TOTAL AREA(ACRES) =      1.40        PEAK FLOW RATE(CFS) =       4.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.33
  FLOW VELOCITY(FEET/SEC.) =  3.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5010.00 =   864.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      1.40  TC(MIN.) =      9.79
  PEAK FLOW RATE(CFS)   =      4.16
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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**************************************************************************

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                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 6000 - 100-YAER, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S6000P00.RAT
  TIME/DATE OF STUDY: 16:43 01/28/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   6000.00 TO NODE   6002.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
 UPSTREAM ELEVATION(FEET) =    120.00
 DOWNSTREAM ELEVATION(FEET) =    116.00
 ELEVATION DIFFERENCE(FEET) =      4.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.723
 *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
  DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE   6002.00 TO NODE   6005.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  116.00  DOWNSTREAM ELEVATION(FEET) =  106.00
 STREET LENGTH(FEET) =   426.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 48.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  43.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.48
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
 STREET FLOW TRAVEL TIME(MIN.) =   2.50   Tc(MIN.) =   8.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.734
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6600
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.96
 TOTAL AREA(ACRES) =      1.30        PEAK FLOW RATE(CFS) =       3.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.91
 FLOW VELOCITY(FEET/SEC.) =  3.23   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =   525.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6005.00 TO NODE   6010.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    98.00  DOWNSTREAM(FEET) =    83.00
 FLOW LENGTH(FEET) =   519.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.54
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.24
 PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =   9.65
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6010.00 =  1044.00 FEET.
```

```
+-------------------------------------------------------------------------+
| OFF-SITE FLOWS ANTICIPATED AT THIS LOCATION FROM MAINLINE               |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

*************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6010.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.516
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.67
  TOTAL AREA(ACRES) =      1.50   TOTAL RUNOFF(CFS) =    3.91
  TC(MIN.) =   9.65

*************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6010.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.516
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    3.50
  TOTAL AREA(ACRES) =      2.90   TOTAL RUNOFF(CFS) =    7.41
  TC(MIN.) =   9.65

*************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6015.00 IS CODE =  31
-------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    83.00  DOWNSTREAM(FEET) =    78.00
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.41
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =  10.21
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6015.00 =  1314.00 FEET.

+-------------------------------------------------------------------------+
| OFF-SITE FLOW ANTICIPATED AT THIS LOCATION FROM NODE 6006               |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

*************************************************************************
  FLOW PROCESS FROM NODE   6015.00 TO NODE   6015.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.427
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.26
  TOTAL AREA(ACRES) =      3.90   TOTAL RUNOFF(CFS) =   10.66
  TC(MIN.) =  10.21
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6015.00 TO NODE   6020.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.00  DOWNSTREAM(FEET) =    77.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.66
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  10.31
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6020.00 =  1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6020.00 TO NODE   6020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.416
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.25
  TOTAL AREA(ACRES) =      4.90   TOTAL RUNOFF(CFS) =   13.91
  TC(MIN.) =  10.31

****************************************************************************
  FLOW PROCESS FROM NODE   6020.00 TO NODE   6025.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    77.00  DOWNSTREAM(FEET) =    75.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.69
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.91
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  10.69
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6025.00 =  1539.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6025.00 TO NODE   6025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.375
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =      5.00   TOTAL RUNOFF(CFS) =   14.23
  TC(MIN.) =  10.69

****************************************************************************
  FLOW PROCESS FROM NODE   6025.00 TO NODE   6025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.375
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.64
  TOTAL AREA(ACRES) =      5.20   TOTAL RUNOFF(CFS) =   14.87
  TC(MIN.) =  10.69

****************************************************************************
  FLOW PROCESS FROM NODE   6025.00 TO NODE   6040.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    74.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.07
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.87
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  11.15
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6040.00 =  1709.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6040.00 TO NODE   6040.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.15
  RAINFALL INTENSITY(INCH/HR) =   3.32
  TOTAL STREAM AREA(ACRES) =     5.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.87

****************************************************************************
  FLOW PROCESS FROM NODE   6030.00 TO NODE   6032.00 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) =    98.00
  UPSTREAM ELEVATION(FEET) =    133.00
  DOWNSTREAM ELEVATION(FEET) =    122.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.194
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   6032.00 TO NODE   6035.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  122.00  DOWNSTREAM ELEVATION(FEET) =   75.00
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   2.76   Tc(MIN.) =   8.76
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.685
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.80
  TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =       3.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.78
  FLOW VELOCITY(FEET/SEC.) =  4.81   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE   6030.00 TO NODE   6035.00 =   809.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6035.00 TO NODE   6035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.685
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    5.40   SUBAREA RUNOFF(CFS) =   15.92
  TOTAL AREA(ACRES) =      6.30   TOTAL RUNOFF(CFS) =   19.12
  TC(MIN.) =   8.76

****************************************************************************
  FLOW PROCESS FROM NODE   6035.00 TO NODE   6040.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    74.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.90
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.12
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   8.97
  LONGEST FLOWPATH FROM NODE   6030.00 TO NODE   6040.00 =   909.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6040.00 TO NODE   6040.00 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.) =   8.97
  RAINFALL INTENSITY(INCH/HR) =   3.65
  TOTAL STREAM AREA(ACRES) =     6.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.12

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
```

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	14.87	11.15	3.323	5.20
2	19.12	8.97	3.645	6.30

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	32.68	8.97	3.645
2	32.30	11.15	3.323

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 32.68 Tc(MIN.) = 8.97
TOTAL AREA(ACRES) = 11.50
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6040.00 = 1709.00 FEET.

****
FLOW PROCESS FROM NODE 6040.00 TO NODE 6040.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.645
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .9500
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) = 0.40 SUBAREA RUNOFF(CFS) = 1.39
TOTAL AREA(ACRES) = 11.90 TOTAL RUNOFF(CFS) = 34.06
TC(MIN.) = 8.97

****
FLOW PROCESS FROM NODE 6040.00 TO NODE 6045.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 74.00 DOWNSTREAM(FEET) = 70.00
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.46
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 34.06
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 9.19
LONGEST FLOWPATH FROM NODE 6000.00 TO NODE 6045.00 = 1874.00 FEET.

****
FLOW PROCESS FROM NODE 6045.00 TO NODE 6045.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.603
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .9500
S.C.S. CURVE NUMBER (AMC II) = 0
SUBAREA AREA(ACRES) = 0.20 SUBAREA RUNOFF(CFS) = 0.68
TOTAL AREA(ACRES) = 12.10 TOTAL RUNOFF(CFS) = 34.75
TC(MIN.) = 9.19

****
FLOW PROCESS FROM NODE 6045.00 TO NODE 6045.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.603
*USER SPECIFIED(SUBAREA):

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =     12.30   TOTAL RUNOFF(CFS) =   35.43
  TC(MIN.) =   9.19

****************************************************************************
  FLOW PROCESS FROM NODE   6045.00 TO NODE   6060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    70.00  DOWNSTREAM(FEET) =    62.00
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.08
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     35.43
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   9.50
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6060.00 =  2129.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6060.00 TO NODE   6060.00 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.) =   9.50
  RAINFALL INTENSITY(INCH/HR) =   3.55
  TOTAL STREAM AREA(ACRES) =    12.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.43

****************************************************************************
  FLOW PROCESS FROM NODE   6050.00 TO NODE   6052.00 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) =    72.00
  UPSTREAM ELEVATION(FEET) =    104.00
  DOWNSTREAM ELEVATION(FEET) =    101.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.424
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   6053.00 TO NODE   6053.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  101.00  DOWNSTREAM ELEVATION(FEET) =   90.00
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 46.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  41.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
  STREET FLOW TRAVEL TIME(MIN.) =   3.35   Tc(MIN.) =   9.35
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.574
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    2.04
  TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =       2.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.96
  FLOW VELOCITY(FEET/SEC.) =  2.89   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6053.00 =   594.00 FEET.

+----------------------------------------------------------------------------+
| OFF-SITE FLOWS ANTICIPATED AT THIS LOCATION FROM BROWDITCH                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   6053.00 TO NODE   6054.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   90.00  DOWNSTREAM ELEVATION(FEET) =   83.00
  STREET LENGTH(FEET) =   317.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 46.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  41.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
  STREET FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =  11.06
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.334
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.27
  TOTAL AREA(ACRES) =      1.10        PEAK FLOW RATE(CFS) =       3.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.65
```

```
 FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6054.00 =   911.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6054.00 TO NODE   6054.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.334
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6900
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    3.45
 TOTAL AREA(ACRES) =      2.60   TOTAL RUNOFF(CFS) =    7.15
 TC(MIN.) =  11.06

****************************************************************************
 FLOW PROCESS FROM NODE   6054.00 TO NODE   6055.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    83.00  DOWNSTREAM(FEET) =    74.00
 FLOW LENGTH(FEET) =   710.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      7.15
 PIPE TRAVEL TIME(MIN.) =   1.72    Tc(MIN.) =  12.78
 LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6055.00 =  1621.00 FEET.

+----------------------------------------------------------------------------+
| OFF-SITE FLOWS ANTICIPATED AT THIS LOCATION FROM MAINLINE                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   6055.00 TO NODE   6055.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    2.95
 TOTAL AREA(ACRES) =      4.00   TOTAL RUNOFF(CFS) =   10.10
 TC(MIN.) =  12.78

****************************************************************************
 FLOW PROCESS FROM NODE   6055.00 TO NODE   6055.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6300
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    2.77
 TOTAL AREA(ACRES) =      5.40   TOTAL RUNOFF(CFS) =   12.88
 TC(MIN.) =  12.78

****************************************************************************
 FLOW PROCESS FROM NODE   6055.00 TO NODE   6057.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    72.00  DOWNSTREAM(FEET) =    67.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.88
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  12.90
  LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6057.00 =  1721.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6057.00 TO NODE   6057.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.82
  TOTAL AREA(ACRES) =      6.10   TOTAL RUNOFF(CFS) =   14.70
  TC(MIN.) =  12.90

****************************************************************************
  FLOW PROCESS FROM NODE   6057.00 TO NODE   6057.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.35
  TOTAL AREA(ACRES) =      6.70   TOTAL RUNOFF(CFS) =   16.05
  TC(MIN.) =  12.90

****************************************************************************
  FLOW PROCESS FROM NODE   6057.00 TO NODE   6060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    67.00  DOWNSTREAM(FEET) =    62.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.05
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  13.02
  LONGEST FLOWPATH FROM NODE   6050.00 TO NODE   6060.00 =  1821.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6060.00 TO NODE   6060.00 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.) =  13.02
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =     6.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.05
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       35.43     9.50        3.546         12.30
      2       16.05    13.02        3.118          6.70

  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       49.54     9.50       3.546
      2       47.20    13.02       3.118

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     49.54   Tc(MIN.) =    9.50
  TOTAL AREA(ACRES) =     19.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6060.00 =  2129.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6060.00 TO NODE   6065.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    62.00  DOWNSTREAM(FEET) =    61.00
  FLOW LENGTH(FEET) =   370.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.04
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.54
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =  10.52
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6065.00 =  2499.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6065.00 TO NODE   6065.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.393
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    5.68
  TOTAL AREA(ACRES) =     20.80   TOTAL RUNOFF(CFS) =   55.22
  TC(MIN.) =  10.52

****************************************************************************
  FLOW PROCESS FROM NODE   6065.00 TO NODE   6070.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    61.00  DOWNSTREAM(FEET) =    59.00
  FLOW LENGTH(FEET) =   625.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.57
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     55.22
  PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =  12.10
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6070.00 =  3124.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6070.00 TO NODE   6070.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.219
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   12.88
  TOTAL AREA(ACRES) =     25.80   TOTAL RUNOFF(CFS) =   68.10
  TC(MIN.) =  12.10

************************************************************************
  FLOW PROCESS FROM NODE   6070.00 TO NODE   6070.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.219
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.29
  TOTAL AREA(ACRES) =     26.90   TOTAL RUNOFF(CFS) =   71.39
  TC(MIN.) =  12.10

************************************************************************
  FLOW PROCESS FROM NODE   6070.00 TO NODE   6070.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.219
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.53
  TOTAL AREA(ACRES) =     27.40   TOTAL RUNOFF(CFS) =   72.92
  TC(MIN.) =  12.10

************************************************************************
  FLOW PROCESS FROM NODE   6070.00 TO NODE   6095.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.00  DOWNSTREAM(FEET) =    57.00
  FLOW LENGTH(FEET) =   700.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.79
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     72.92
  PIPE TRAVEL TIME(MIN.) =   1.72    Tc(MIN.) =  13.82
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6095.00 =  3824.00 FEET.
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     27.40  TC(MIN.) =     13.82
  PEAK FLOW RATE(CFS)   =     72.92
========================================================================
========================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

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**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* SDSU MISSION VALLEY                                                    *
* BASIN 7000 - 100-YEAR, 6-HR STORM EVENT                                *
* JN-18150                                                               *
 ************************************************************************

  FILE NAME: S7000E00.RAT
  TIME/DATE OF STUDY: 14:09 01/25/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  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   7000.00 TO NODE   7002.00 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) =    78.00
  UPSTREAM ELEVATION(FEET) =     65.00
  DOWNSTREAM ELEVATION(FEET) =     64.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.195
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE   7002.00 TO NODE   7005.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   64.00  DOWNSTREAM ELEVATION(FEET) =   59.00
  STREET LENGTH(FEET) =   176.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   7.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.997
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.40
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7005.00 =   254.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.20  TC(MIN.) =      7.12
  PEAK FLOW RATE(CFS)   =      0.78
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

SDSU West
J-18150
1/28/2019

Weighted Runoff Coefficient Back-up

		Pre-Project	
		Land Use	
		Undisturbed Natural Terrain	Asphalt/Concrete
Runoff Coefficient for 'D' Soils[1]		0.45	0.95
% Imperviousness		0%	100%

U/S Node	D/S Node	AES Code	Area (ac)	Area by Land Use		Weighted Runoff Coefficient
				Undisturbed Natural Terrain (ac)	Asphalt/Concrete (ac)	
4000	4002	2	0.1	0.02	0.09	0.88
5000	5002	2	0.1	0.03	0.09	0.81
5002	5010	6	1.3	0.3	1.0	0.84
6000	6002	2	0.1	0.06	0.08	0.73
6002	6005	6	1.1	0.6	0.5	0.68
6010	6010	6	0.2		0.1	0.95
6015	6015	8	1.7	0.7	1.0	0.75
6020	6020	8	0.9		0.9	0.95
6025	6025	8	0.1		0.1	0.95
6025	6025	8	0.2		0.2	0.95
6030	6032	2	0.1		0.1	0.95
6032	6035	6	0.8	0.1	0.7	0.89
6035	6035	8	5.4	1.7	3.7	0.80
6040	6040	8	0.5		0.5	0.95
6045	6045	8	0.2		0.2	0.95
6045	6045	8	0.2		0.2	0.95
6050	6052	2	0.1		0.1	0.95
6052	6053	6	0.5		0.5	0.95
6053	6054	6	0.4		0.4	0.95
6054	6054	8	1.4	0.7	0.7	0.70
6055	6055	8	1.5	0.9	0.6	0.65
6055	6055	8	1.5	1.0	0.5	0.62
6057	6057	8	0.6	0.3	0.3	0.70
6057	6057	8	0.6	0.2	0.4	0.79
6065	6065	8	1.8	0.2	1.6	0.90
6070	6070	8	4.8	1.8	3.0	0.77
6070	6070	8	1.1		1.1	0.95
7000	7002	2	0.1		0.1	0.95
7002	7005	6	0.1		0.1	0.95

1. The runoff coefficients for each land use are based on guidance provided in the City of San Diego Drainage Design Manual (January 2017) and are modeled based on type 'D' soils.

SDSU West
J-18150
1/28/2019

Weighted Runoff Coefficient Back-up

		Post-Project	
		Land Use	
		Undisturbed Natural Terrain	Asphalt/Concrete
Runoff Coefficient for 'D' Soils[1]		0.45	0.95
% Imperviousness		0%	100%

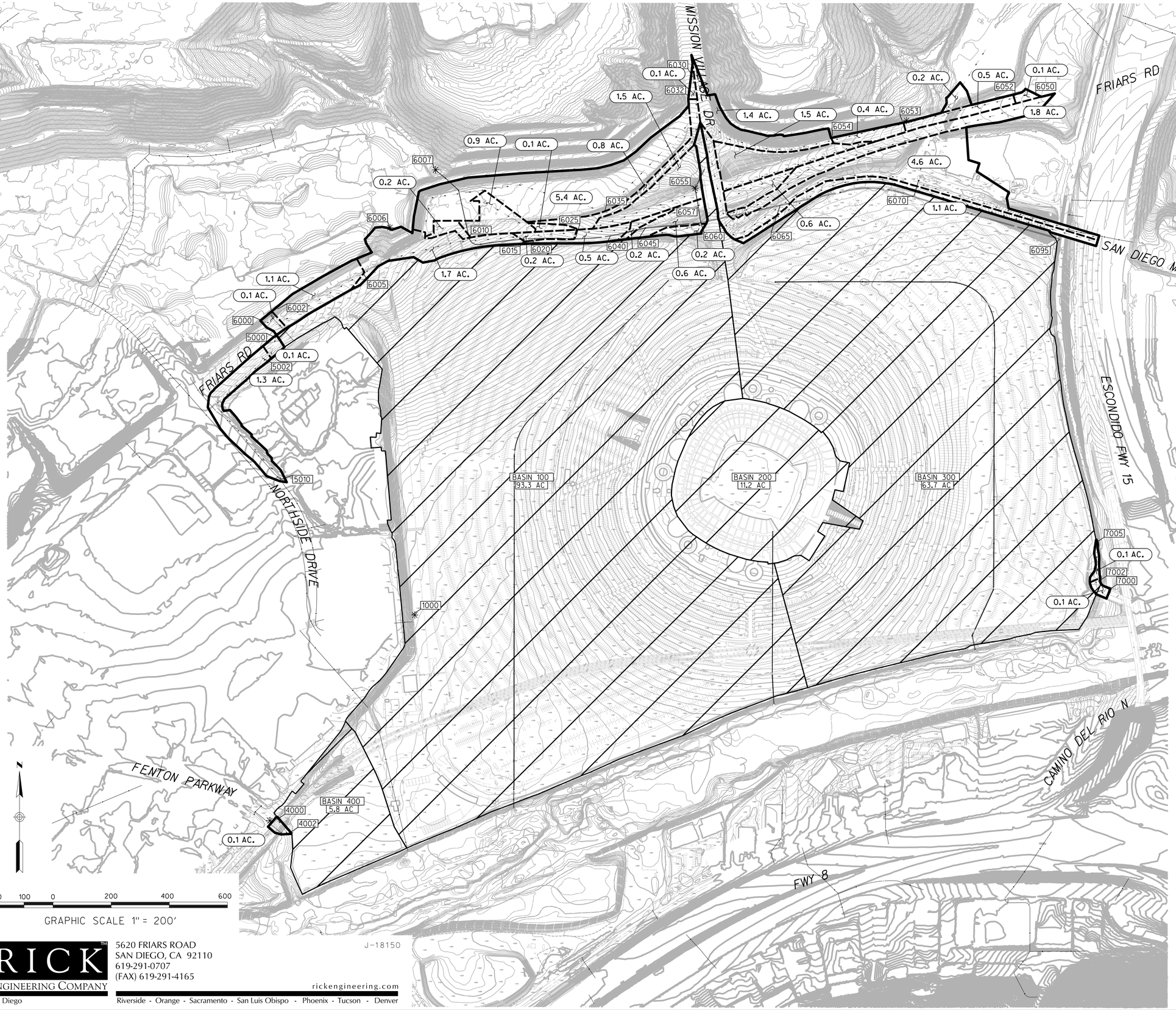
U/S Node	D/S Node	AES Code	Area (ac)	Area by Land Use		Weighted Runoff Coefficient
				Undisturbed Natural Terrain	Asphalt/Concrete	
4000	4002	2	0.1		0.1	0.95
4002	4005	6	0.8		0.8	0.95
4005	4005	8	0.3		0.3	0.95
5000	5002	2	0.1	0.03	0.10	0.84
5002	5010	6	1.3	0.3	1.0	0.84
6000	6002	2	0.1	0.08	0.06	0.68
6002	6005	6	1.2	0.7	0.5	0.66
6010	6010	8	1.4	0.7	0.7	0.71
6010	6010	8	0.2		0.2	0.95
6015	6015	8	1.0		1.0	0.95
6020	6020	8	1.0		1.0	0.95
6025	6025	8	0.1		0.1	0.95
6025	6025	8	0.2		0.2	0.95
6030	6032	2	0.1		0.1	0.95
6032	6035	6	0.8		0.8	0.95
6035	6035	8	5.4	1.7	3.7	0.79
6040	6040	8	0.4		0.4	0.95
6045	6045	8	0.2		0.2	0.95
6045	6045	8	0.2		0.2	0.95
6050	6052	2	0.1		0.1	0.95
6052	6053	6	0.6		0.6	0.95
6053	6054	6	0.4		0.4	0.95
6054	6054	8	1.5	0.8	0.7	0.69
6055	6055	8	1.4	0.8	0.6	0.67
6055	6055	8	1.4	0.9	0.5	0.63
6057	6057	8	0.7	0.2	0.5	0.83
6057	6057	8	0.6	0.3	0.3	0.72
6065	6065	8	1.8	0.1	1.7	0.93
6070	6070	8	5.0	1.5	3.5	0.80
6070	6070	8	1.1	0.1	1.0	0.93
6070	6070	8	0.5		0.5	0.95
7000	7002	2	0.1		0.1	0.95
7002	7005	6	0.1		0.1	0.95

Notes:

1. The runoff coefficients for each land use are based on guidance provided in the City of San Diego Drainage Design Manual (January 2017) and are modeled based on type 'D' soils.

Map Pocket 1

Pre-Project Condition



LEGEND

- XXXX — BASIN ID
- X.X AC. — BASIN AREA
- MAJOR BASIN BOUNDARY
- SUB BASIN BOUNDARY
- FLOW PATH
- * — OFFSITE FLOWS ANTICIPATED AT THIS LOCATION
- ONSITE AREA

NOTES

ADDITIONAL ANALYSIS OF THE ONSITE AREA IS PROVIDED IN A REPORT PREPARED BY RICK ENGINEERING, TITLED "DRAINAGE STUDY FOR SDSU MISSION VALLEY CAMPUS," DATED JANUARY 31, 2019.

OFFSITE DRAINAGE STUDY EXHIBIT FOR SDSU MISSION VALLEY CAMPUS (PRE-PROJECT)

J-18150 Date: January 31, 2019

RICK ENGINEERING COMPANY
San Diego
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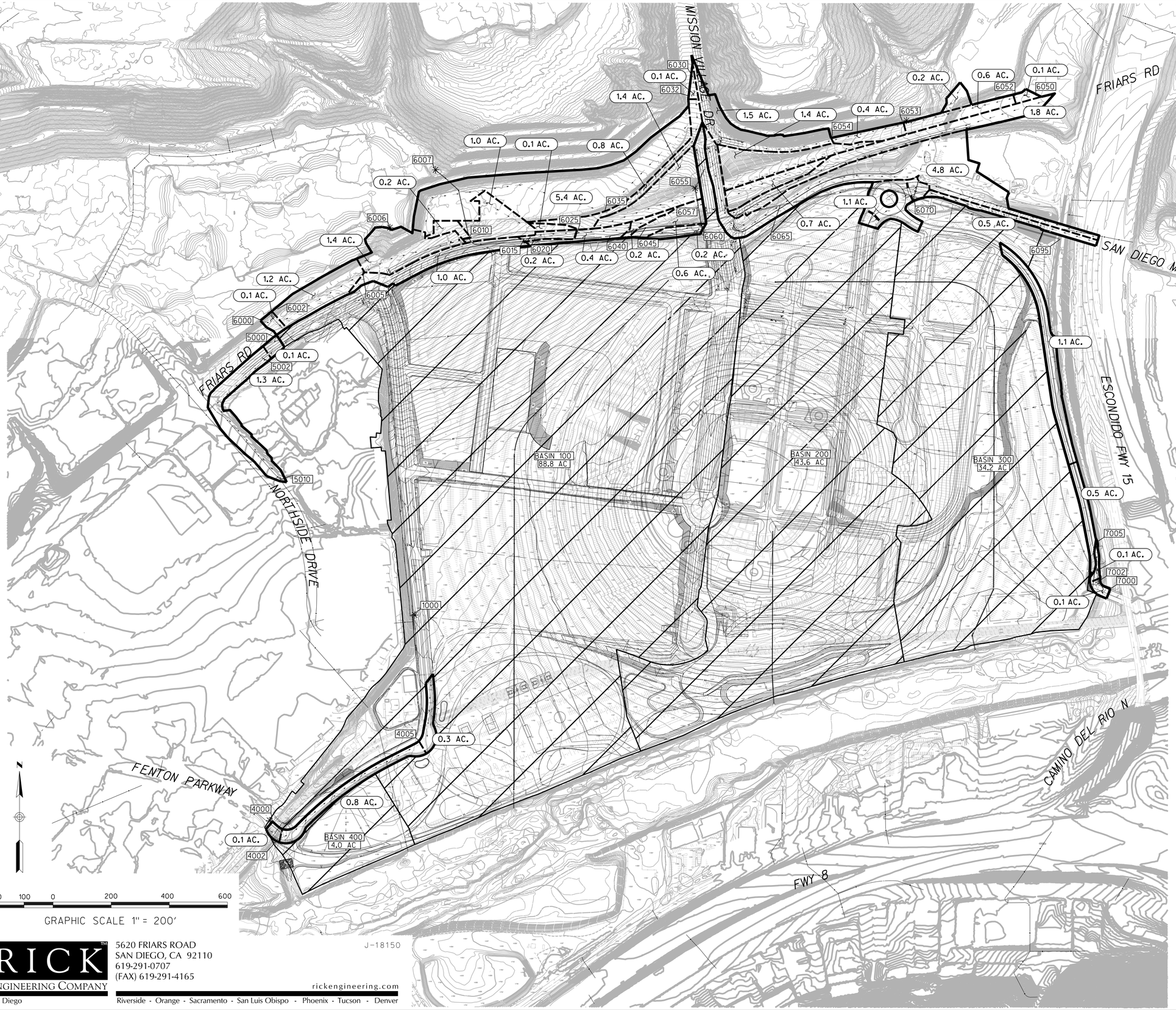
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-18150

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

Map Pocket 2

Post-Project Condition



LEGEND

- XXXX — BASIN ID
- X.X AC. — BASIN AREA
- MAJOR BASIN BOUNDARY
- SUB BASIN BOUNDARY
- FLOW PATH
- * — OFFSITE FLOWS ANTICIPATED AT THIS LOCATION
- ONSITE AREA

NOTES

ADDITIONAL ANALYSIS OF THE ONSITE AREA IS PROVIDED IN A REPORT PREPARED BY RICK ENGINEERING, TITLED "DRAINAGE STUDY FOR SDSU MISSION VALLEY CAMPUS," DATED JANUARY 31, 2019.

OFFSITE DRAINAGE STUDY EXHIBIT FOR SDSU MISSION VALLEY CAMPUS (POST-PROJECT)

J-18150 Date: January 31, 2019

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NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY