23161 MILL CREEK PROJECT

CITY OF LAGUNA HILLS

FINAL HYDROLOGY REPORT

Prepared for:

Toll Brothers
350 Commerce, Suite 200
Irvine, CA 92602

October, 2025

Prepared by:
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I. INTRODUCTION

A. PROJECT DESCRIPTION:

Toll Brothers is proposing the development of a 2.4 acre site within the City of Laguna Hills, at Mill Creek Drive (Refer to Project Location Map, Figure 1). The site will consist of 18 duplex units, 36 residences.

The existing project site is currently a commercial building and parking lot and surface drains through a series of v-gutters down the drive entrance on onto Mill Creek Drive. There are currently no underground storm drain pipes.

The drainage from the project is collected by a series of area drains and catch basins to collect street flow. The south half of the property drains out to Mill Creek through a proposed parkway culvert near the proposed driveway. The north half of the property drains out to Mill Creek Drive through a second proposed parkway culvert near the northeast corner of the site.

B. PURPOSE:

This drainage report is intended to analyze the proposed drainage facilities associated with the project improvements and determine that the receiving facilities are not overburdened.

C. METHODOLOGY:

The existing and proposed conditions were analyzed utilizing the Advanced Engineering Software (AES) package for Orange County (RATSCX) (ref. 2). A rational method hydrology analysis was performed on both the existing pre-development, and proposed post-development condition for the 25 and 100-year storm events. The results are summarized in the table below and included in Appendix A and B of this report.

Existing Condition	Area (ac)	Q25 (cfs)	Q100 (cfs)
Sub-area A	2.2	8.0	10.3
Sub-area B	0.2	0.9	1.1
Total	**2.4**	**8.9**	**11.4**
Proposed Condition			
Sub-area A	0.9	3.6	4.4
Sub-area B	1.5	4.3	5.6
Total (node 29)	**2.4**	**7.5**	**9.7**

The storm volumes were analyzed using the Civil D unit hydrograph (ref 3) module for Orange County. The point precipitation values were taken from NOAA Atlas 14 for the Laguna Hills area. The unit hydrograph results can be found in Appendix C (existing) and D (proposed) and are summarized below:

Existing Condition-Unit Hydrograph

Storm Event	Storm Duration	Total Tribuary Area (ac)	Pervious Percent Ap	Total Storm Volume (ac-ft)
100-Year	24 Hour	2.4 ac	22%	1.054 ac-ft

Proposed Condition-Unit Hydrograph

Storm Event	Storm Duration	Total Tribuary Area (ac)	Pervious Percent Ap	Total Storm Volume (ac-ft)
100-Year	24 Hour	2.4 ac	27%	1.046 ac-ft

The storm volume and peak flow rates in the existing condition does not exceed the expected storm volume or peak flow rates in the proposed condition and no on-site detention is required.

The computer program, Advanced Engineering Software (AES), Hydraulic Elements 1 (ref 6), was used to size the proposed catch basins for the 25-year flow. This program uses the input values of basin inflow, basin opening height, and depth of water ponded in the sump condition or depth of approaching water for the flow-by condition to determine an estimated basin width based on the Bureau of Public Roads nomograph plots. The basins were sized to the next largest design width (3.5' or 7') such that the basin capacities are sufficient to handle the projected flows and no flooding is expected to impede the flow of traffic. The grate inlets were analyzed using Flowmaster (ref 4) inlet capacity analysis to determine ponding depth for sump conditions and grate efficiency for flow-by condition. The calculations and summary table can be found in Appendix E of this report. The parkway culvert widths were calculated using AES HELE 1 for channel flow. The calculations can be found in Appendix F.

The hydraulic calculations for the reinforced concrete pipe were performed using the WSPG hydraulic gradient program for the 25-year storm event. PVC pipes were sized using the AES HELE 1 which uses the manning equation to determine the minimum pipe size for a specified slope and flow. The calculations can be found in Appendix H.

D. CONCLUSION:

These analyses and calculations confirm that the proposed development does not overburden the downstream drainage facility or increase flow onto Mill Creek Drive and no on-site detention is required. Additionally, protection of onsite structures will be maintained for the 100-year storm event.

II. REFERENCES

1. Orange County Hydrology Manual, 1986/1996 Addendum
2. Advanced Engineering Software (AES) RATSCX, 2016
3. Civil Design Software (CIVILD), 2018
4. Flowmaster, Bentley System, 2020
5. Water Surface Pressure Gradient for Windows (WSPW), 2005
6. Advanced Engineering Software (AES) HELE 1, 2016

III. APPENDICES

APPENDIX A

EXISTING CONDITION RATIONAL METHOD AND HYDROLOGY MAP

25-YEAR

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******************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1557

                           Analysis prepared by:

                              Wilson Mikami, Inc
                          9 CORPORATE PARK, SUITE 100
                                IRVINE, CA 92606
                                 (949) 679-0090

 ************************** DESCRIPTION OF STUDY **************************
* KHOSHBIN MILL CREEK PROPERTY                                            *
* EXISTING CONDITION 25-YEAR HYDROLOGY                                    *
* BY KAM 091524                                                           *
 ****************************************************************************

  FILE NAME: EX_MC2.DAT
  TIME/DATE OF STUDY: 12:57 09/16/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    316.50  DOWNSTREAM(FEET) =    304.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  D        0.18      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.18   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  304.00  DOWNSTREAM ELEVATION(FEET) =  299.70
  STREET LENGTH(FEET) =   185.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 10.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.14
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =    6.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.287
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.19      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.73
  EFFECTIVE AREA(ACRES) =      0.37    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.42

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.31
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.287
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.96      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.96      SUBAREA RUNOFF(CFS) =    3.69
  EFFECTIVE AREA(ACRES) =      1.33   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       5.11

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.70  DOWNSTREAM(FEET) =    296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00   CHANNEL SLOPE =  0.0311
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   7.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.155
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.55      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.70
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =    6.51
  SUBAREA AREA(ACRES) =     0.55       SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =      1.88     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       7.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   5.84
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.51
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.155
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"      D        0.27      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.96

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  ELEVATION DATA: UPSTREAM(FEET) =    302.00  DOWNSTREAM(FEET) =    272.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF"      D        0.21      0.20     1.000    81    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.87
 TOTAL AREA(ACRES) =      0.21   PEAK FLOW RATE(CFS) =      0.87
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.00
 EFFECTIVE AREA(ACRES) =      0.21  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       0.87
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

100-YEAR

```
******************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1557

                           Analysis prepared by:

                              Wilson Mikami, Inc
                          9 CORPORATE PARK, SUITE 100
                                IRVINE, CA 92606
                                 (949) 679-0090

 ************************** DESCRIPTION OF STUDY **************************
* KHOSHBIN MILL CREEK PROPERTY                                            *
* EXISTING CONDITION 100-YEAR HYDROLOGY                                   *
* BY KAM 091524                                                           *
 ****************************************************************************

  FILE NAME: EX_MC2.DAT
  TIME/DATE OF STUDY: 12:57 09/16/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    316.50  DOWNSTREAM(FEET) =    304.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  D        0.18      0.20     0.100    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.00
  TOTAL AREA(ACRES) =      0.18   PEAK FLOW RATE(CFS) =      1.00

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  304.00  DOWNSTREAM ELEVATION(FEET) =  299.70
  STREET LENGTH(FEET) =   185.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 10.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.47
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   1.10   Tc(MIN.) =    6.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.520
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.19      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.94
  EFFECTIVE AREA(ACRES) =      0.37    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.18
  FLOW VELOCITY(FEET/SEC.) =  2.89   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.520
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.96      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.96      SUBAREA RUNOFF(CFS) =    4.75
  EFFECTIVE AREA(ACRES) =      1.33   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    299.70  DOWNSTREAM(FEET) =    296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00   CHANNEL SLOPE =  0.0311
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   7.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.357
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.55      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.07
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =    6.43
  SUBAREA AREA(ACRES) =     0.55       SUBAREA RUNOFF(CFS) =    2.64
  EFFECTIVE AREA(ACRES) =      1.88     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       9.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   6.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     507.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.357
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"      D        0.27      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    1.25
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =      10.28

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  ELEVATION DATA: UPSTREAM(FEET) =    302.00  DOWNSTREAM(FEET) =    272.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "CHAPARRAL,BROADLEAF"      D        0.21      0.20     1.000    95    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.13
 TOTAL AREA(ACRES) =      0.21   PEAK FLOW RATE(CFS) =      1.13
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.00
 EFFECTIVE AREA(ACRES) =      0.21  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       1.13
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

HYDROLOGY MAP

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

LEGEND

- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- FLOWLINE AND DIRECTION OF FLOW
- A5 / 0.30 — SUBAREA LABEL / AREA (ACRES)
- (20) — NODE NUMBER

Q25	25-YEAR PEAK FLOW IN CFS
Q100	100-YEAR PEAK FLOW IN CFS
WS 100	100-YEAR PEAK FLOW WATER SURFACE ELEVATION
QCONF	100-YEAR CONFLUENCE PEAK FLOW IN CFS
TC	TIME OF CONCENTRATION (100-YEAR STORM) IN MIN
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
FL	FLOW LINE ELEVATION
INV.	INVERT OF PIPE
L=870'	LENGTH OF FLOWPATH IN FEET
L_p=92'	LENGTH OF PIPE IN FEET

NO.	DATE	REVISIONS

DESIGNED BY:	ES
DRAFTED BY:	ES
CHECKED BY:	KM
DATE:	9/24

WILSON MIKAMI CORPORATION
9 CORPORATE PARK, SUITE 100
IRVINE, CA 92606
T: 949-679-0090

LAGUNA HILLS
KHOSHBIN MILL CREEK PROPERTY
EXISTING CONDITION HYDROLOGY MAP

PROJECT NO. 10501.00

SHEET 1 OF 1

S:\10501.00\dwg\PREX0004_EXISTING HYDROLOGY.dwg 9/16/24

APPENDIX B
PROPOSED CONDITION RATIONAL METHOD AND HYDROLOGY MAP

25-YEAR

```
******************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1557

                           Analysis prepared by:

                              Wilson Mikami, Inc
                          9 CORPORATE PARK, SUITE 100
                                IRVINE, CA 92606
                                 (949) 679-0090

 ************************** DESCRIPTION OF STUDY **************************
* PROPOSED MILL CREEK ROAD PROPERTY                                       *
* 25-YEAR HYDROLOGY ANALYSIS                                              *
* BY KAM 090125                                                           *
 ****************************************************************************

  FILE NAME: PR-KOSH.DAT
  TIME/DATE OF STUDY: 14:33 09/01/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   PS

  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   131.00
  ELEVATION DATA: UPSTREAM(FEET) =    312.40  DOWNSTREAM(FEET) =    310.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.817
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.746
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                D        0.08      0.20      0.100    75    7.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.08   PEAK FLOW RATE(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.746
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.07      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =      0.15   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.50

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   305.70  DOWNSTREAM(FEET) =   305.20
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.50
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.96
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.96
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.707
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.15      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.99

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   305.20  DOWNSTREAM(FEET) =   304.20
  FLOW LENGTH(FEET) =    99.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.99
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    8.32
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.32
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.615
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.16      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      0.46   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.48

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.32
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.615
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.09      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      0.55   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       1.77

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   304.20  DOWNSTREAM(FEET) =   301.70
  FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.77
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    8.68
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     427.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.68
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.529
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.06      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.19
 EFFECTIVE AREA(ACRES) =      0.61   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       1.92

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   301.70  DOWNSTREAM(FEET) =   300.70
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.02
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.92
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    8.76
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     462.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.76
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.513
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.12      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.38
 EFFECTIVE AREA(ACRES) =      0.73   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        0.7       PEAK FLOW RATE(CFS) =       2.29

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   300.70  DOWNSTREAM(FEET) =   297.10
 FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
```

```
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.29
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.84
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =     518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.06      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.19
  EFFECTIVE AREA(ACRES) =      0.79   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       2.46

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                    D        0.04      0.20     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =      0.83   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       2.58

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   297.10  DOWNSTREAM(FEET) =   296.40
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.58
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.94
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     17.00 =     560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.94
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.471
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.06      0.20      0.100    75
  NATURAL FAIR COVER
  "GRASS"                     D        0.02      0.20      1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      0.91   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       2.81

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.40  DOWNSTREAM(FEET) =   292.40
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.98
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.81
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    9.01
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =     610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     29.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  292.40  DOWNSTREAM ELEVATION(FEET) =  273.60
  STREET LENGTH(FEET) =   194.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.050

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    3.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.94
  STREET FLOW TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =    9.46
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.362
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"       D        0.30      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.85
  EFFECTIVE AREA(ACRES) =      1.21    AREA-AVERAGED Fm(INCH/HR) =  0.08
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   4.06
  FLOW VELOCITY(FEET/SEC.) =  7.21   DEPTH*VELOCITY(FT*FT/SEC.) =   2.05
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =     804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =    9.46
  RAINFALL INTENSITY(INCH/HR) =   3.36
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       1.21
  TOTAL STREAM AREA(ACRES) =       1.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.57

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   173.00
  ELEVATION DATA: UPSTREAM(FEET) =    306.00  DOWNSTREAM(FEET) =    303.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.718
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.471
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                D        0.07      0.20      0.100    75    5.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   299.80  DOWNSTREAM(FEET) =   299.50
  FLOW LENGTH(FEET) =    13.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.51
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.28
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.77
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =    5.77
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.450
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.03      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.03      SUBAREA RUNOFF(CFS) =    0.12
 EFFECTIVE AREA(ACRES) =      0.10   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.1       PEAK FLOW RATE(CFS) =       0.40

********************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
--------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   299.50  DOWNSTREAM(FEET) =   299.20
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.68
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.40
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    6.17
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     251.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =    6.17
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.283
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.18      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.18      SUBAREA RUNOFF(CFS) =    0.69
 EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.07

********************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
--------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   299.20  DOWNSTREAM(FEET) =   298.90
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.47
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.07
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    6.48
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =     316.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.48
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.165
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.12      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.45
 EFFECTIVE AREA(ACRES) =      0.40   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.49

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.48
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.165
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.10      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =      0.50   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.86

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   298.90  DOWNSTREAM(FEET) =   298.60
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.96
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.86
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    6.76
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     383.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.76
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.066
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.15      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      0.65   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.36

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.76
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.11      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =      0.76   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       2.76

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.60  DOWNSTREAM(FEET) =   298.30
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.90
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.76
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.93
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =     431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.011
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.14      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       3.22

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

```
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   298.30  DOWNSTREAM(FEET) =   298.20
 FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.75
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.22
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.99
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =     449.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.99
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.991
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.19      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.68
 EFFECTIVE AREA(ACRES) =      1.09   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       3.88

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.99
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.991
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.12      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.43
 EFFECTIVE AREA(ACRES) =      1.21   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =       4.31

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   298.20  DOWNSTREAM(FEET) =   298.00
 FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.27
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.31
```

```
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.10
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     28.00 =     485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.00  DOWNSTREAM(FEET) =   273.60
  FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.11
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.31
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     29.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.14
  RAINFALL INTENSITY(INCH/HR) =   3.94
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.16
  EFFECTIVE STREAM AREA(ACRES) =       1.21
  TOTAL STREAM AREA(ACRES) =       1.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.57    9.46    3.362  0.20( 0.08) 0.41       1.2      10.00
      2        4.31    7.14    3.944  0.20( 0.03) 0.16       1.2      20.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        7.48    7.14    3.944  0.20( 0.05) 0.27       2.1      20.00
      2        7.24    9.46    3.362  0.20( 0.06) 0.29       2.4      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.48    Tc(MIN.) =     7.14
  EFFECTIVE AREA(ACRES) =       2.12   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        2.4
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =     804.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =      7.14
  EFFECTIVE AREA(ACRES) =      2.12  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.269
  PEAK FLOW RATE(CFS)   =       7.48
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.48	7.14	3.944	0.20(0.05)	0.27	2.1	20.00
2	7.24	9.46	3.362	0.20(0.06)	0.29	2.4	10.00

END OF RATIONAL METHOD ANALYSIS

100-YEAR

```
******************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                           Analysis prepared by:

                              Wilson Mikami, Inc
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                                IRVINE, CA 92606
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 ************************** DESCRIPTION OF STUDY **************************
* PROPOSED MILL CREEK ROAD PROPERTY                                       *
* 100-YEAR HYDROLOGY ANALYSIS                                             *
* BY KAM 090125                                                           *
 ****************************************************************************

  FILE NAME: PR-KOSH.DAT
  TIME/DATE OF STUDY: 14:34 09/01/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   131.00
  ELEVATION DATA: UPSTREAM(FEET) =    312.40  DOWNSTREAM(FEET) =    310.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.817
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.790
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  D        0.08      0.20     0.100    91    7.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.08   PEAK FLOW RATE(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.790
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.07      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.30
  EFFECTIVE AREA(ACRES) =      0.15   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.64

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   305.70  DOWNSTREAM(FEET) =   305.20
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.66
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.64
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.95
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.742
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.15      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.63
  EFFECTIVE AREA(ACRES) =      0.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.27

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   305.20  DOWNSTREAM(FEET) =   304.20
  FLOW LENGTH(FEET) =    99.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.27
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    8.29
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.630
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.16      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =      0.46   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.90

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.630
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.09      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.37
  EFFECTIVE AREA(ACRES) =      0.55   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.27

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   304.20  DOWNSTREAM(FEET) =   301.70
  FLOW LENGTH(FEET) =   142.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.27
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    8.64
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     427.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.64
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.523
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.06      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.24
 EFFECTIVE AREA(ACRES) =      0.61   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.46

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   301.70  DOWNSTREAM(FEET) =   300.70
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.46
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    8.71
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     462.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.503
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.12      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.48
 EFFECTIVE AREA(ACRES) =      0.73   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        0.7       PEAK FLOW RATE(CFS) =       2.94

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   300.70  DOWNSTREAM(FEET) =   297.10
 FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       2.94
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.78
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =     518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.480
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.06      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.06      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      0.79   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       3.16

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.480
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "GRASS"                   D        0.04      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      0.83   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       3.32

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   297.10  DOWNSTREAM(FEET) =   296.40
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.32
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    8.88
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     17.00 =     560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.453
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.06      0.20      0.100    91
  NATURAL FAIR COVER
  "GRASS"                     D        0.02      0.20      1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.32
  EFFECTIVE AREA(ACRES) =      0.91   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       3.61

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   296.40  DOWNSTREAM(FEET) =   292.40
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.61
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.94
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =     610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     29.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  292.40  DOWNSTREAM ELEVATION(FEET) =  273.60
  STREET LENGTH(FEET) =   194.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.050

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.17
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    4.36
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.23
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    9.37
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.317
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"       D        0.30      0.20      1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =      1.21    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.41
```

```
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       4.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   4.55
  FLOW VELOCITY(FEET/SEC.) =  7.67   DEPTH*VELOCITY(FT*FT/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =     804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =    9.37
  RAINFALL INTENSITY(INCH/HR) =   4.32
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       1.21
  TOTAL STREAM AREA(ACRES) =       1.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.61

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   173.00
  ELEVATION DATA: UPSTREAM(FEET) =    306.00  DOWNSTREAM(FEET) =    303.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.718
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.730
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.07      0.20      0.100    91    5.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   299.80  DOWNSTREAM(FEET) =   299.50
  FLOW LENGTH(FEET) =    13.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.82
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.76
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =    5.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.704
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.03      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.03      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      0.10   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.1       PEAK FLOW RATE(CFS) =       0.51

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   299.50  DOWNSTREAM(FEET) =   299.20
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.88
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.51
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     251.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.501
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.18      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.18      SUBAREA RUNOFF(CFS) =    0.88
  EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   299.20  DOWNSTREAM(FEET) =   298.90
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.38
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    6.44
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =     316.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.352
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.12      0.20     0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.57
 EFFECTIVE AREA(ACRES) =      0.40   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.91

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.352
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.10      0.20     0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.48
 EFFECTIVE AREA(ACRES) =      0.50   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.39

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   298.90  DOWNSTREAM(FEET) =   298.60
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.39
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    6.71
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     383.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.228
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.15      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.70
  EFFECTIVE AREA(ACRES) =      0.65   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       3.04

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.228
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.11      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      0.76   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       3.55

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.60  DOWNSTREAM(FEET) =   298.30
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.29
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =     431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.162
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.14      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.65
  EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       4.15

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.30  DOWNSTREAM(FEET) =   298.20
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.15
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.92
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.137
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.19      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.88
  EFFECTIVE AREA(ACRES) =      1.09   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       5.01

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.137
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.12      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      1.21   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =       5.56

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   298.20  DOWNSTREAM(FEET) =   298.00
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.50
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.56
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.03
```

```
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     28.00 =     485.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   298.00  DOWNSTREAM(FEET) =   273.60
 FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.64
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.56
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.06
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     29.00 =     538.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.06
 RAINFALL INTENSITY(INCH/HR) =   5.08
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.16
 EFFECTIVE STREAM AREA(ACRES) =       1.21
 TOTAL STREAM AREA(ACRES) =       1.21
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.61    9.37    4.317  0.20( 0.08) 0.41       1.2      10.00
     2        5.56    7.06    5.079  0.20( 0.03) 0.16       1.2      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.66    7.06    5.079  0.20( 0.05) 0.27       2.1      20.00
     2        9.33    9.37    4.317  0.20( 0.06) 0.29       2.4      10.00

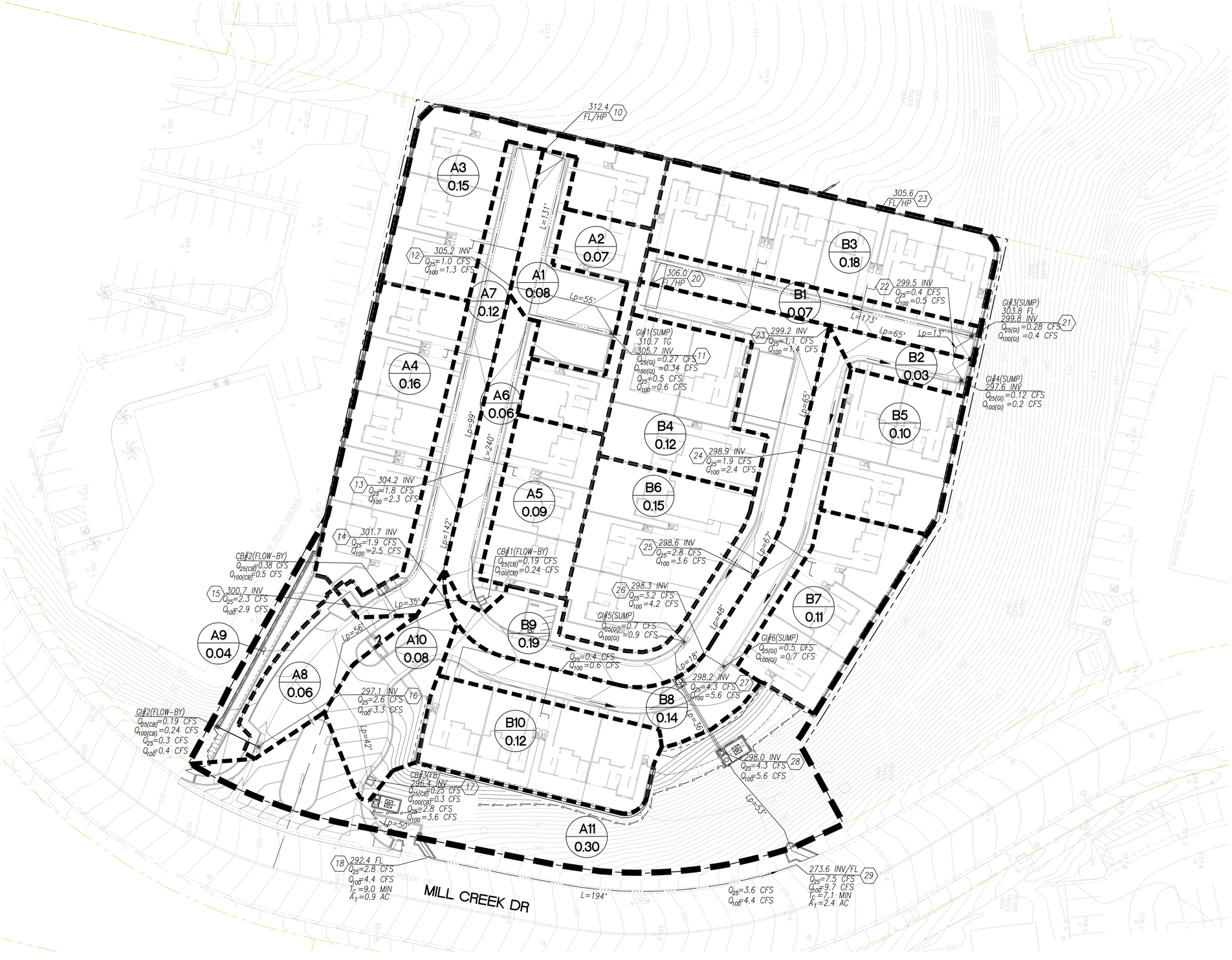
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.66    Tc(MIN.) =     7.06
 EFFECTIVE AREA(ACRES) =       2.12   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =        2.4
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =     804.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =      7.06
 EFFECTIVE AREA(ACRES) =      2.12  AREA-AVERAGED Fm(INCH/HR)=  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.268
 PEAK FLOW RATE(CFS)   =       9.66

 ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.66	7.06	5.079	0.20(0.05)	0.27	2.1	20.00
2	9.33	9.37	4.317	0.20(0.06)	0.29	2.4	10.00

END OF RATIONAL METHOD ANALYSIS

HYDROLOGY MAP



LEGEND

- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- FLOWLINE AND DIRECTION OF FLOW
- A5 / 0.30 — SUBAREA LABEL / AREA (ACRES)
- (20) — NODE NUMBER

Q25	25-YEAR PEAK FLOW IN CFS
Q100	100-YEAR PEAK FLOW IN CFS
WS 100	100-YEAR PEAK FLOW WATER SURFACE ELEVATION
QCONF	100-YEAR CONFLUENCE PEAK FLOW IN CFS
TC	TIME OF CONCENTRATION (100-YEAR STORM) IN MIN
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
FL	FLOW LINE ELEVATION
INV.	INVERT OF PIPE
L=870'	LENGTH OF FLOWPATH IN FEET
L_t=92'	LENGTH OF PIPE IN FEET

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

NO.	DATE	REVISIONS

DESIGNED BY:	ES
DRAFTED BY:	ES
CHECKED BY:	KM
DATE:	9/25

WILSON MIKAMI CORPORATION
9 CORPORATE PARK, SUITE 100
IRVINE, CA 92606
T: 949-679-0090

LAGUNA HILLS
23161 MILL CREEK DEVELOPMENT
PROPOSED CONDITION HYDROLOGY MAP

PROJECT NO. 10501.00

SHEET 1 OF 1

S:\10501.00\dwg\PREX0005_PROPOSED HYDROLOGY.dwg 9/26/25

APPENDIX C

UNIT HYDROGRAPH
EXISTING CONDITION

U n i t H y d r o g r a p h A n a l y s i s

Study date 01/17/25 File Name exkosh.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6615

KHOSHBIN MILL CREEK
EXISTING CONDITION UNIT HYDROGRAPH 100-YEAR 24-HOUR
BY KAM 011525

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	2.4	1.00	D	0.200	0.220	0.044

Area-averaged adjusted loss rate Fm (In/Hr) = 0.044

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
0.53	0.220	75.0	91.0	0.99	0.816
1.87	0.780	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.927
Area-averaged low loss fraction, Yb = 0.073
++
Direct entry of lag time by user
Watershed area = 2.40(Ac.)
Catchment Lag time = 0.085 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 97.6944
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.044(In/Hr)
Average low loss rate fraction (Yb) = 0.073 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.520(In)
Computed peak 30-minute rainfall = 1.090(In)
Specified peak 1-hour rainfall = 1.450(In)
Computed peak 3-hour rainfall = 2.430(In)

Specified peak 6-hour rainfall = 3.360(In)
Specified peak 24-hour rainfall = 5.630(In)

Rainfall depth area reduction factors:
Using a total area of 2.40(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.520(In)
30-minute factor = 1.000 Adjusted rainfall = 1.090(In)
1-hour factor = 1.000 Adjusted rainfall = 1.450(In)
3-hour factor = 1.000 Adjusted rainfall = 2.430(In)
6-hour factor = 1.000 Adjusted rainfall = 3.360(In)
24-hour factor = 1.000 Adjusted rainfall = 5.630(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 29.02 (CFS))		
1	13.614	3.952
2	69.070	16.096
3	87.941	5.478
4	95.642	2.235
5	98.353	0.787
6	99.235	0.256
7	99.824	0.171
8	100.000	0.051

Total soil rain loss = 0.35(In)
Total effective rainfall = 5.28(In)
Peak flow rate in flood hydrograph = 10.00(CFS)

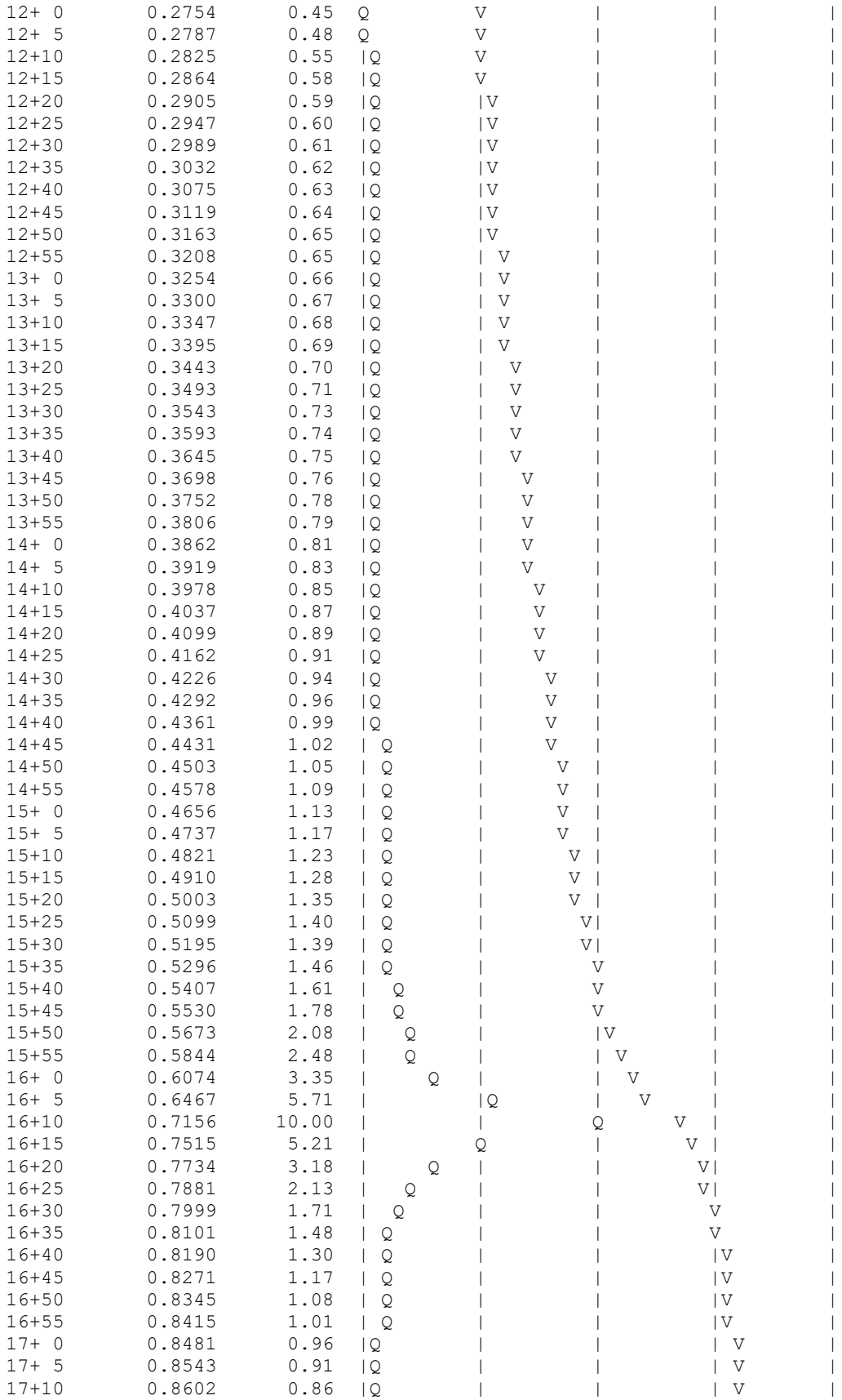
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0002	0.03	Q				
0+10	0.0011	0.14	Q				
0+15	0.0023	0.17	Q				
0+20	0.0036	0.19	Q				
0+25	0.0049	0.19	Q				
0+30	0.0063	0.20	Q				
0+35	0.0077	0.20	Q				
0+40	0.0090	0.20	Q				
0+45	0.0104	0.20	Q				
0+50	0.0118	0.20	Q				
0+55	0.0132	0.20	Q				
1+ 0	0.0146	0.20	Q				
1+ 5	0.0160	0.20	Q				
1+10	0.0174	0.20	Q				
1+15	0.0188	0.20	Q				
1+20	0.0202	0.21	Q				
1+25	0.0216	0.21	Q				

1+30	0.0230	0.21	Q				
1+35	0.0245	0.21	Q				
1+40	0.0259	0.21	Q				
1+45	0.0273	0.21	QV				
1+50	0.0288	0.21	QV				
1+55	0.0302	0.21	QV				
2+ 0	0.0317	0.21	QV				
2+ 5	0.0332	0.21	QV				
2+10	0.0346	0.21	QV				
2+15	0.0361	0.21	QV				
2+20	0.0376	0.21	QV				
2+25	0.0390	0.22	QV				
2+30	0.0405	0.22	QV				
2+35	0.0420	0.22	QV				
2+40	0.0435	0.22	QV				
2+45	0.0450	0.22	QV				
2+50	0.0465	0.22	QV				
2+55	0.0481	0.22	QV				
3+ 0	0.0496	0.22	QV				
3+ 5	0.0511	0.22	QV				
3+10	0.0526	0.22	QV				
3+15	0.0542	0.22	Q V				
3+20	0.0557	0.22	Q V				
3+25	0.0573	0.23	Q V				
3+30	0.0588	0.23	Q V				
3+35	0.0604	0.23	Q V				
3+40	0.0620	0.23	Q V				
3+45	0.0636	0.23	Q V				
3+50	0.0652	0.23	Q V				
3+55	0.0667	0.23	Q V				
4+ 0	0.0683	0.23	Q V				
4+ 5	0.0700	0.23	Q V				
4+10	0.0716	0.23	Q V				
4+15	0.0732	0.24	Q V				
4+20	0.0748	0.24	Q V				
4+25	0.0764	0.24	Q V				
4+30	0.0781	0.24	Q V				
4+35	0.0797	0.24	Q V				
4+40	0.0814	0.24	Q V				
4+45	0.0831	0.24	Q V				
4+50	0.0847	0.24	Q V				
4+55	0.0864	0.24	Q V				
5+ 0	0.0881	0.25	Q V				
5+ 5	0.0898	0.25	Q V				
5+10	0.0915	0.25	Q V				
5+15	0.0932	0.25	Q V				
5+20	0.0949	0.25	Q V				
5+25	0.0967	0.25	Q V				
5+30	0.0984	0.25	Q V				
5+35	0.1001	0.25	Q V				
5+40	0.1019	0.25	Q V				
5+45	0.1037	0.26	Q V				
5+50	0.1054	0.26	Q V				
5+55	0.1072	0.26	Q V				
6+ 0	0.1090	0.26	Q V				
6+ 5	0.1108	0.26	Q V				
6+10	0.1126	0.26	Q V				
6+15	0.1144	0.26	Q V				
6+20	0.1163	0.27	Q V				
6+25	0.1181	0.27	Q V				
6+30	0.1200	0.27	Q V				
6+35	0.1218	0.27	Q V				
6+40	0.1237	0.27	Q V				

6+45	0.1256	0.27	Q	V	|	|	|	|
6+50	0.1274	0.27	Q	V	|	|	|	|
6+55	0.1293	0.28	Q	V	|	|	|	|
7+ 0	0.1313	0.28	Q	V	|	|	|	|
7+ 5	0.1332	0.28	Q	V	|	|	|	|
7+10	0.1351	0.28	Q	V	|	|	|	|
7+15	0.1371	0.28	Q	V	|	|	|	|
7+20	0.1390	0.28	Q	V	|	|	|	|
7+25	0.1410	0.29	Q	V	|	|	|	|
7+30	0.1430	0.29	Q	V	|	|	|	|
7+35	0.1449	0.29	Q	V	|	|	|	|
7+40	0.1470	0.29	Q	V	|	|	|	|
7+45	0.1490	0.29	Q	V	|	|	|	|
7+50	0.1510	0.29	Q	V	|	|	|	|
7+55	0.1530	0.30	Q	V	|	|	|	|
8+ 0	0.1551	0.30	Q	V	|	|	|	|
8+ 5	0.1572	0.30	Q	V	|	|	|	|
8+10	0.1592	0.30	Q	V	|	|	|	|
8+15	0.1613	0.30	Q	V	|	|	|	|
8+20	0.1634	0.31	Q	V	|	|	|	|
8+25	0.1656	0.31	Q	V	|	|	|	|
8+30	0.1677	0.31	Q	V	|	|	|	|
8+35	0.1698	0.31	Q	V	|	|	|	|
8+40	0.1720	0.31	Q	V	|	|	|	|
8+45	0.1742	0.32	Q	V	|	|	|	|
8+50	0.1764	0.32	Q	V	|	|	|	|
8+55	0.1786	0.32	Q	V	|	|	|	|
9+ 0	0.1808	0.32	Q	V	|	|	|	|
9+ 5	0.1831	0.33	Q	V	|	|	|	|
9+10	0.1853	0.33	Q	V	|	|	|	|
9+15	0.1876	0.33	Q	V	|	|	|	|
9+20	0.1899	0.33	Q	V	|	|	|	|
9+25	0.1922	0.34	Q	V	|	|	|	|
9+30	0.1946	0.34	Q	V	|	|	|	|
9+35	0.1969	0.34	Q	V	|	|	|	|
9+40	0.1993	0.34	Q	V	|	|	|	|
9+45	0.2017	0.35	Q	V	|	|	|	|
9+50	0.2041	0.35	Q	V	|	|	|	|
9+55	0.2065	0.35	Q	V	|	|	|	|
10+ 0	0.2090	0.36	Q	V	|	|	|	|
10+ 5	0.2114	0.36	Q	V	|	|	|	|
10+10	0.2139	0.36	Q	V	|	|	|	|
10+15	0.2164	0.36	Q	V	|	|	|	|
10+20	0.2190	0.37	Q	V	|	|	|	|
10+25	0.2215	0.37	Q	V	|	|	|	|
10+30	0.2241	0.38	Q	V	|	|	|	|
10+35	0.2267	0.38	Q	V	|	|	|	|
10+40	0.2294	0.38	Q	V	|	|	|	|
10+45	0.2320	0.39	Q	V	|	|	|	|
10+50	0.2347	0.39	Q	V	|	|	|	|
10+55	0.2374	0.39	Q	V	|	|	|	|
11+ 0	0.2401	0.40	Q	V	|	|	|	|
11+ 5	0.2429	0.40	Q	V	|	|	|	|
11+10	0.2457	0.41	Q	V	|	|	|	|
11+15	0.2485	0.41	Q	V	|	|	|	|
11+20	0.2514	0.41	Q	V	|	|	|	|
11+25	0.2542	0.42	Q	V	|	|	|	|
11+30	0.2572	0.42	Q	V	|	|	|	|
11+35	0.2601	0.43	Q	V	|	|	|	|
11+40	0.2631	0.43	Q	V	|	|	|	|
11+45	0.2661	0.44	Q	V	|	|	|	|
11+50	0.2692	0.44	Q	V	|	|	|	|
11+55	0.2723	0.45	Q	V	|	|	|	|



17+15	0.8659	0.82	Q			V
17+20	0.8713	0.79	Q			V
17+25	0.8766	0.76	Q			V
17+30	0.8816	0.73	Q			V
17+35	0.8865	0.71	Q			V
17+40	0.8913	0.69	Q			V
17+45	0.8959	0.67	Q			V
17+50	0.9004	0.65	Q			V
17+55	0.9047	0.63	Q			V
18+ 0	0.9090	0.62	Q			V
18+ 5	0.9130	0.59	Q			V
18+10	0.9165	0.51	Q			V
18+15	0.9198	0.47	Q			V
18+20	0.9229	0.45	Q			V
18+25	0.9259	0.44	Q			V
18+30	0.9289	0.43	Q			V
18+35	0.9317	0.42	Q			V
18+40	0.9346	0.41	Q			V
18+45	0.9373	0.40	Q			V
18+50	0.9400	0.39	Q			V
18+55	0.9427	0.38	Q			V
19+ 0	0.9453	0.38	Q			V
19+ 5	0.9478	0.37	Q			V
19+10	0.9503	0.36	Q			V
19+15	0.9528	0.36	Q			V
19+20	0.9552	0.35	Q			V
19+25	0.9576	0.35	Q			V
19+30	0.9599	0.34	Q			V
19+35	0.9622	0.34	Q			V
19+40	0.9645	0.33	Q			V
19+45	0.9667	0.33	Q			V
19+50	0.9689	0.32	Q			V
19+55	0.9711	0.32	Q			V
20+ 0	0.9733	0.31	Q			V
20+ 5	0.9754	0.31	Q			V
20+10	0.9775	0.30	Q			V
20+15	0.9795	0.30	Q			V
20+20	0.9816	0.30	Q			V
20+25	0.9836	0.29	Q			V
20+30	0.9856	0.29	Q			V
20+35	0.9875	0.28	Q			V
20+40	0.9895	0.28	Q			V
20+45	0.9914	0.28	Q			V
20+50	0.9933	0.28	Q			V
20+55	0.9952	0.27	Q			V
21+ 0	0.9970	0.27	Q			V
21+ 5	0.9988	0.27	Q			V
21+10	1.0007	0.26	Q			V
21+15	1.0025	0.26	Q			V
21+20	1.0042	0.26	Q			V
21+25	1.0060	0.26	Q			V
21+30	1.0077	0.25	Q			V
21+35	1.0095	0.25	Q			V
21+40	1.0112	0.25	Q			V
21+45	1.0129	0.25	Q			V
21+50	1.0145	0.24	Q			V
21+55	1.0162	0.24	Q			V
22+ 0	1.0178	0.24	Q			V
22+ 5	1.0195	0.24	Q			V
22+10	1.0211	0.23	Q			V
22+15	1.0227	0.23	Q			V
22+20	1.0243	0.23	Q			V
22+25	1.0259	0.23	Q			V

22+30	1.0274	0.23	Q	|	|	|	V |
22+35	1.0290	0.23	Q	|	|	|	V |
22+40	1.0305	0.22	Q	|	|	|	V|
22+45	1.0320	0.22	Q	|	|	|	V|
22+50	1.0336	0.22	Q	|	|	|	V|
22+55	1.0351	0.22	Q	|	|	|	V|
23+ 0	1.0366	0.22	Q	|	|	|	V|
23+ 5	1.0380	0.21	Q	|	|	|	V|
23+10	1.0395	0.21	Q	|	|	|	V|
23+15	1.0410	0.21	Q	|	|	|	V|
23+20	1.0424	0.21	Q	|	|	|	V|
23+25	1.0438	0.21	Q	|	|	|	V|
23+30	1.0453	0.21	Q	|	|	|	V|
23+35	1.0467	0.21	Q	|	|	|	V|
23+40	1.0481	0.20	Q	|	|	|	V|
23+45	1.0495	0.20	Q	|	|	|	V|
23+50	1.0509	0.20	Q	|	|	|	V|
23+55	1.0523	0.20	Q	|	|	|	V|
24+ 0	1.0536	0.20	Q	|	|	|	V|

APPENDIX D

UNIT HYDROGRAPH
PROPOSED CONDITION

U n i t H y d r o g r a p h A n a l y s i s

Study date 09/26/25 File Name prkosh.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6615

23161 Mill Creek Development
PROPOSED CONDITION UNIT HYDROGRAPH 100-YEAR 24 HOUR STORM EVENT
by KAM 092625

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
75.0	2.4	1.00	D	0.200	0.270	0.054

Area-averaged adjusted loss rate Fm (In/Hr) = 0.054

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
0.65	0.270	75.0	91.0	0.99	0.816
1.75	0.730	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.920
Area-averaged low loss fraction, Yb = 0.080
++
User entry of time of concentration = 0.118 (hours)
Watershed area = 2.40(Ac.)
Catchment Lag time = 0.094 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 88.2768
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.054(In/Hr)
Average low loss rate fraction (Yb) = 0.080 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.520(In)
Computed peak 30-minute rainfall = 1.090(In)
Specified peak 1-hour rainfall = 1.450(In)
Computed peak 3-hour rainfall = 2.430(In)

Specified peak 6-hour rainfall = 3.360(In)
Specified peak 24-hour rainfall = 5.630(In)

Rainfall depth area reduction factors:
Using a total area of 2.40(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.520(In)
30-minute factor = 1.000 Adjusted rainfall = 1.090(In)
1-hour factor = 1.000 Adjusted rainfall = 1.450(In)
3-hour factor = 1.000 Adjusted rainfall = 2.430(In)
6-hour factor = 1.000 Adjusted rainfall = 3.360(In)
24-hour factor = 1.000 Adjusted rainfall = 5.630(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 29.02 (CFS))	
1	10.845	3.148
2	63.629	15.321
3	85.010	6.206
4	93.781	2.546
5	97.635	1.119
6	98.834	0.348
7	99.488	0.190
8	100.000	0.149

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5199	0.5199
2	0.6923	0.1724
3	0.8185	0.1262
4	0.9218	0.1033
5	1.0108	0.0890
6	1.0899	0.0791
7	1.1613	0.0714
8	1.2269	0.0656
9	1.2879	0.0610
10	1.3450	0.0571
11	1.3988	0.0538
12	1.4498	0.0510
13	1.5054	0.0556
14	1.5588	0.0534
15	1.6102	0.0514
16	1.6598	0.0496
17	1.7078	0.0480
18	1.7543	0.0465
19	1.7994	0.0452
20	1.8433	0.0439
21	1.8861	0.0428
22	1.9278	0.0417
23	1.9685	0.0407
24	2.0083	0.0398
25	2.0472	0.0389
26	2.0853	0.0381
27	2.1226	0.0373
28	2.1592	0.0366
29	2.1951	0.0359
30	2.2304	0.0353

31	2.2650	0.0346
32	2.2991	0.0341
33	2.3326	0.0335
34	2.3655	0.0330
35	2.3980	0.0325
36	2.4300	0.0320
37	2.4613	0.0313
38	2.4922	0.0309
39	2.5226	0.0304
40	2.5527	0.0300
41	2.5823	0.0296
42	2.6116	0.0293
43	2.6404	0.0289
44	2.6690	0.0285
45	2.6972	0.0282
46	2.7250	0.0279
47	2.7526	0.0275
48	2.7798	0.0272
49	2.8067	0.0269
50	2.8333	0.0266
51	2.8597	0.0264
52	2.8858	0.0261
53	2.9116	0.0258
54	2.9371	0.0256
55	2.9624	0.0253
56	2.9875	0.0251
57	3.0123	0.0248
58	3.0369	0.0246
59	3.0613	0.0244
60	3.0854	0.0241
61	3.1094	0.0239
62	3.1331	0.0237
63	3.1566	0.0235
64	3.1800	0.0233
65	3.2031	0.0231
66	3.2260	0.0229
67	3.2488	0.0228
68	3.2714	0.0226
69	3.2938	0.0224
70	3.3160	0.0222
71	3.3381	0.0221
72	3.3600	0.0219
73	3.3773	0.0173
74	3.3944	0.0172
75	3.4114	0.0170
76	3.4283	0.0169
77	3.4450	0.0167
78	3.4616	0.0166
79	3.4781	0.0165
80	3.4944	0.0163
81	3.5106	0.0162
82	3.5267	0.0161
83	3.5426	0.0160
84	3.5585	0.0158
85	3.5742	0.0157
86	3.5898	0.0156
87	3.6053	0.0155
88	3.6206	0.0154
89	3.6359	0.0153
90	3.6511	0.0152
91	3.6661	0.0151
92	3.6811	0.0149
93	3.6959	0.0148

94	3.7107	0.0147
95	3.7253	0.0146
96	3.7399	0.0146
97	3.7543	0.0145
98	3.7687	0.0144
99	3.7830	0.0143
100	3.7971	0.0142
101	3.8112	0.0141
102	3.8252	0.0140
103	3.8392	0.0139
104	3.8530	0.0138
105	3.8668	0.0138
106	3.8804	0.0137
107	3.8940	0.0136
108	3.9075	0.0135
109	3.9210	0.0134
110	3.9343	0.0134
111	3.9476	0.0133
112	3.9608	0.0132
113	3.9739	0.0131
114	3.9870	0.0131
115	4.0000	0.0130
116	4.0129	0.0129
117	4.0257	0.0128
118	4.0385	0.0128
119	4.0512	0.0127
120	4.0639	0.0126
121	4.0764	0.0126
122	4.0890	0.0125
123	4.1014	0.0124
124	4.1138	0.0124
125	4.1261	0.0123
126	4.1384	0.0123
127	4.1506	0.0122
128	4.1627	0.0121
129	4.1748	0.0121
130	4.1868	0.0120
131	4.1988	0.0120
132	4.2107	0.0119
133	4.2225	0.0118
134	4.2343	0.0118
135	4.2461	0.0117
136	4.2577	0.0117
137	4.2694	0.0116
138	4.2809	0.0116
139	4.2925	0.0115
140	4.3039	0.0115
141	4.3154	0.0114
142	4.3267	0.0114
143	4.3381	0.0113
144	4.3493	0.0113
145	4.3605	0.0112
146	4.3717	0.0112
147	4.3828	0.0111
148	4.3939	0.0111
149	4.4050	0.0110
150	4.4159	0.0110
151	4.4269	0.0109
152	4.4378	0.0109
153	4.4486	0.0108
154	4.4594	0.0108
155	4.4702	0.0108
156	4.4809	0.0107

157	4.4916	0.0107
158	4.5022	0.0106
159	4.5128	0.0106
160	4.5233	0.0105
161	4.5338	0.0105
162	4.5443	0.0105
163	4.5547	0.0104
164	4.5651	0.0104
165	4.5755	0.0103
166	4.5858	0.0103
167	4.5960	0.0103
168	4.6063	0.0102
169	4.6165	0.0102
170	4.6266	0.0102
171	4.6367	0.0101
172	4.6468	0.0101
173	4.6568	0.0100
174	4.6668	0.0100
175	4.6768	0.0100
176	4.6867	0.0099
177	4.6966	0.0099
178	4.7065	0.0099
179	4.7163	0.0098
180	4.7261	0.0098
181	4.7359	0.0098
182	4.7456	0.0097
183	4.7553	0.0097
184	4.7650	0.0097
185	4.7746	0.0096
186	4.7842	0.0096
187	4.7937	0.0096
188	4.8033	0.0095
189	4.8128	0.0095
190	4.8222	0.0095
191	4.8317	0.0094
192	4.8411	0.0094
193	4.8504	0.0094
194	4.8598	0.0093
195	4.8691	0.0093
196	4.8784	0.0093
197	4.8876	0.0093
198	4.8969	0.0092
199	4.9060	0.0092
200	4.9152	0.0092
201	4.9243	0.0091
202	4.9335	0.0091
203	4.9425	0.0091
204	4.9516	0.0091
205	4.9606	0.0090
206	4.9696	0.0090
207	4.9786	0.0090
208	4.9875	0.0089
209	4.9964	0.0089
210	5.0053	0.0089
211	5.0142	0.0089
212	5.0230	0.0088
213	5.0318	0.0088
214	5.0406	0.0088
215	5.0494	0.0088
216	5.0581	0.0087
217	5.0668	0.0087
218	5.0755	0.0087
219	5.0841	0.0087

220	5.0928	0.0086
221	5.1014	0.0086
222	5.1100	0.0086
223	5.1185	0.0086
224	5.1271	0.0085
225	5.1356	0.0085
226	5.1441	0.0085
227	5.1525	0.0085
228	5.1610	0.0084
229	5.1694	0.0084
230	5.1778	0.0084
231	5.1861	0.0084
232	5.1945	0.0083
233	5.2028	0.0083
234	5.2111	0.0083
235	5.2194	0.0083
236	5.2277	0.0083
237	5.2359	0.0082
238	5.2441	0.0082
239	5.2523	0.0082
240	5.2605	0.0082
241	5.2686	0.0082
242	5.2768	0.0081
243	5.2849	0.0081
244	5.2929	0.0081
245	5.3010	0.0081
246	5.3091	0.0080
247	5.3171	0.0080
248	5.3251	0.0080
249	5.3331	0.0080
250	5.3410	0.0080
251	5.3490	0.0079
252	5.3569	0.0079
253	5.3648	0.0079
254	5.3727	0.0079
255	5.3806	0.0079
256	5.3884	0.0078
257	5.3962	0.0078
258	5.4041	0.0078
259	5.4118	0.0078
260	5.4196	0.0078
261	5.4274	0.0078
262	5.4351	0.0077
263	5.4428	0.0077
264	5.4505	0.0077
265	5.4582	0.0077
266	5.4658	0.0077
267	5.4735	0.0076
268	5.4811	0.0076
269	5.4887	0.0076
270	5.4963	0.0076
271	5.5039	0.0076
272	5.5114	0.0076
273	5.5190	0.0075
274	5.5265	0.0075
275	5.5340	0.0075
276	5.5415	0.0075
277	5.5489	0.0075
278	5.5564	0.0075
279	5.5638	0.0074
280	5.5712	0.0074
281	5.5786	0.0074
282	5.5860	0.0074

283	5.5934	0.0074
284	5.6007	0.0074
285	5.6081	0.0073
286	5.6154	0.0073
287	5.6227	0.0073
288	5.6300	0.0073

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0073	0.0006	0.0067
2	0.0073	0.0006	0.0067
3	0.0073	0.0006	0.0067
4	0.0074	0.0006	0.0068
5	0.0074	0.0006	0.0068
6	0.0074	0.0006	0.0068
7	0.0074	0.0006	0.0068
8	0.0075	0.0006	0.0069
9	0.0075	0.0006	0.0069
10	0.0075	0.0006	0.0069
11	0.0075	0.0006	0.0069
12	0.0076	0.0006	0.0069
13	0.0076	0.0006	0.0070
14	0.0076	0.0006	0.0070
15	0.0076	0.0006	0.0070
16	0.0077	0.0006	0.0070
17	0.0077	0.0006	0.0071
18	0.0077	0.0006	0.0071
19	0.0078	0.0006	0.0071
20	0.0078	0.0006	0.0071
21	0.0078	0.0006	0.0072
22	0.0078	0.0006	0.0072
23	0.0079	0.0006	0.0072
24	0.0079	0.0006	0.0073
25	0.0079	0.0006	0.0073
26	0.0079	0.0006	0.0073
27	0.0080	0.0006	0.0073
28	0.0080	0.0006	0.0074
29	0.0080	0.0006	0.0074
30	0.0081	0.0006	0.0074
31	0.0081	0.0007	0.0075
32	0.0081	0.0007	0.0075
33	0.0082	0.0007	0.0075
34	0.0082	0.0007	0.0075
35	0.0082	0.0007	0.0076
36	0.0083	0.0007	0.0076
37	0.0083	0.0007	0.0076
38	0.0083	0.0007	0.0077
39	0.0084	0.0007	0.0077
40	0.0084	0.0007	0.0077
41	0.0084	0.0007	0.0078
42	0.0085	0.0007	0.0078
43	0.0085	0.0007	0.0078
44	0.0085	0.0007	0.0078
45	0.0086	0.0007	0.0079
46	0.0086	0.0007	0.0079
47	0.0087	0.0007	0.0080
48	0.0087	0.0007	0.0080
49	0.0087	0.0007	0.0080
50	0.0088	0.0007	0.0081
51	0.0088	0.0007	0.0081
52	0.0088	0.0007	0.0081

53	0.0089	0.0007	0.0082
54	0.0089	0.0007	0.0082
55	0.0090	0.0007	0.0082
56	0.0090	0.0007	0.0083
57	0.0091	0.0007	0.0083
58	0.0091	0.0007	0.0083
59	0.0091	0.0007	0.0084
60	0.0092	0.0007	0.0084
61	0.0092	0.0007	0.0085
62	0.0093	0.0007	0.0085
63	0.0093	0.0007	0.0086
64	0.0093	0.0008	0.0086
65	0.0094	0.0008	0.0086
66	0.0094	0.0008	0.0087
67	0.0095	0.0008	0.0087
68	0.0095	0.0008	0.0088
69	0.0096	0.0008	0.0088
70	0.0096	0.0008	0.0089
71	0.0097	0.0008	0.0089
72	0.0097	0.0008	0.0089
73	0.0098	0.0008	0.0090
74	0.0098	0.0008	0.0090
75	0.0099	0.0008	0.0091
76	0.0099	0.0008	0.0091
77	0.0100	0.0008	0.0092
78	0.0100	0.0008	0.0092
79	0.0101	0.0008	0.0093
80	0.0102	0.0008	0.0093
81	0.0102	0.0008	0.0094
82	0.0103	0.0008	0.0094
83	0.0103	0.0008	0.0095
84	0.0104	0.0008	0.0095
85	0.0105	0.0008	0.0096
86	0.0105	0.0008	0.0097
87	0.0106	0.0009	0.0097
88	0.0106	0.0009	0.0098
89	0.0107	0.0009	0.0099
90	0.0108	0.0009	0.0099
91	0.0108	0.0009	0.0100
92	0.0109	0.0009	0.0100
93	0.0110	0.0009	0.0101
94	0.0110	0.0009	0.0101
95	0.0111	0.0009	0.0102
96	0.0112	0.0009	0.0103
97	0.0113	0.0009	0.0104
98	0.0113	0.0009	0.0104
99	0.0114	0.0009	0.0105
100	0.0115	0.0009	0.0105
101	0.0116	0.0009	0.0106
102	0.0116	0.0009	0.0107
103	0.0117	0.0009	0.0108
104	0.0118	0.0009	0.0108
105	0.0119	0.0010	0.0109
106	0.0120	0.0010	0.0110
107	0.0121	0.0010	0.0111
108	0.0121	0.0010	0.0112
109	0.0123	0.0010	0.0113
110	0.0123	0.0010	0.0113
111	0.0124	0.0010	0.0114
112	0.0125	0.0010	0.0115
113	0.0126	0.0010	0.0116
114	0.0127	0.0010	0.0117
115	0.0128	0.0010	0.0118

116	0.0129	0.0010	0.0119
117	0.0131	0.0011	0.0120
118	0.0131	0.0011	0.0121
119	0.0133	0.0011	0.0122
120	0.0134	0.0011	0.0123
121	0.0135	0.0011	0.0124
122	0.0136	0.0011	0.0125
123	0.0138	0.0011	0.0126
124	0.0138	0.0011	0.0127
125	0.0140	0.0011	0.0129
126	0.0141	0.0011	0.0130
127	0.0143	0.0011	0.0131
128	0.0144	0.0012	0.0132
129	0.0146	0.0012	0.0134
130	0.0146	0.0012	0.0135
131	0.0148	0.0012	0.0137
132	0.0149	0.0012	0.0137
133	0.0152	0.0012	0.0139
134	0.0153	0.0012	0.0140
135	0.0155	0.0012	0.0142
136	0.0156	0.0013	0.0143
137	0.0158	0.0013	0.0146
138	0.0160	0.0013	0.0147
139	0.0162	0.0013	0.0149
140	0.0163	0.0013	0.0150
141	0.0166	0.0013	0.0153
142	0.0167	0.0013	0.0154
143	0.0170	0.0014	0.0156
144	0.0172	0.0014	0.0158
145	0.0219	0.0018	0.0201
146	0.0221	0.0018	0.0203
147	0.0224	0.0018	0.0206
148	0.0226	0.0018	0.0208
149	0.0229	0.0018	0.0211
150	0.0231	0.0019	0.0213
151	0.0235	0.0019	0.0216
152	0.0237	0.0019	0.0218
153	0.0241	0.0019	0.0222
154	0.0244	0.0020	0.0224
155	0.0248	0.0020	0.0228
156	0.0251	0.0020	0.0230
157	0.0256	0.0021	0.0235
158	0.0258	0.0021	0.0237
159	0.0264	0.0021	0.0242
160	0.0266	0.0021	0.0245
161	0.0272	0.0022	0.0250
162	0.0275	0.0022	0.0253
163	0.0282	0.0023	0.0259
164	0.0285	0.0023	0.0262
165	0.0293	0.0024	0.0269
166	0.0296	0.0024	0.0273
167	0.0304	0.0024	0.0280
168	0.0309	0.0025	0.0284
169	0.0320	0.0026	0.0294
170	0.0325	0.0026	0.0298
171	0.0335	0.0027	0.0308
172	0.0341	0.0027	0.0313
173	0.0353	0.0028	0.0324
174	0.0359	0.0029	0.0330
175	0.0373	0.0030	0.0343
176	0.0381	0.0031	0.0350
177	0.0398	0.0032	0.0366
178	0.0407	0.0033	0.0374

179	0.0428	0.0034	0.0393
180	0.0439	0.0035	0.0404
181	0.0465	0.0037	0.0428
182	0.0480	0.0039	0.0441
183	0.0514	0.0041	0.0472
184	0.0534	0.0043	0.0491
185	0.0510	0.0041	0.0469
186	0.0538	0.0043	0.0495
187	0.0610	0.0045	0.0565
188	0.0656	0.0045	0.0611
189	0.0791	0.0045	0.0746
190	0.0890	0.0045	0.0845
191	0.1262	0.0045	0.1217
192	0.1724	0.0045	0.1679
193	0.5199	0.0045	0.5154
194	0.1033	0.0045	0.0988
195	0.0714	0.0045	0.0669
196	0.0571	0.0045	0.0526
197	0.0556	0.0045	0.0511
198	0.0496	0.0040	0.0456
199	0.0452	0.0036	0.0415
200	0.0417	0.0034	0.0383
201	0.0389	0.0031	0.0358
202	0.0366	0.0029	0.0337
203	0.0346	0.0028	0.0319
204	0.0330	0.0027	0.0303
205	0.0313	0.0025	0.0288
206	0.0300	0.0024	0.0276
207	0.0289	0.0023	0.0266
208	0.0279	0.0022	0.0256
209	0.0269	0.0022	0.0248
210	0.0261	0.0021	0.0240
211	0.0253	0.0020	0.0233
212	0.0246	0.0020	0.0226
213	0.0239	0.0019	0.0220
214	0.0233	0.0019	0.0215
215	0.0228	0.0018	0.0209
216	0.0222	0.0018	0.0204
217	0.0173	0.0014	0.0159
218	0.0169	0.0014	0.0155
219	0.0165	0.0013	0.0151
220	0.0161	0.0013	0.0148
221	0.0157	0.0013	0.0145
222	0.0154	0.0012	0.0141
223	0.0151	0.0012	0.0138
224	0.0147	0.0012	0.0136
225	0.0145	0.0012	0.0133
226	0.0142	0.0011	0.0130
227	0.0139	0.0011	0.0128
228	0.0137	0.0011	0.0126
229	0.0134	0.0011	0.0124
230	0.0132	0.0011	0.0121
231	0.0130	0.0010	0.0119
232	0.0128	0.0010	0.0117
233	0.0126	0.0010	0.0116
234	0.0124	0.0010	0.0114
235	0.0122	0.0010	0.0112
236	0.0120	0.0010	0.0111
237	0.0118	0.0010	0.0109
238	0.0117	0.0009	0.0107
239	0.0115	0.0009	0.0106
240	0.0114	0.0009	0.0105
241	0.0112	0.0009	0.0103

242	0.0111	0.0009	0.0102
243	0.0109	0.0009	0.0101
244	0.0108	0.0009	0.0099
245	0.0107	0.0009	0.0098
246	0.0105	0.0008	0.0097
247	0.0104	0.0008	0.0096
248	0.0103	0.0008	0.0095
249	0.0102	0.0008	0.0094
250	0.0101	0.0008	0.0093
251	0.0100	0.0008	0.0092
252	0.0099	0.0008	0.0091
253	0.0098	0.0008	0.0090
254	0.0097	0.0008	0.0089
255	0.0096	0.0008	0.0088
256	0.0095	0.0008	0.0087
257	0.0094	0.0008	0.0086
258	0.0093	0.0007	0.0085
259	0.0092	0.0007	0.0085
260	0.0091	0.0007	0.0084
261	0.0090	0.0007	0.0083
262	0.0089	0.0007	0.0082
263	0.0089	0.0007	0.0081
264	0.0088	0.0007	0.0081
265	0.0087	0.0007	0.0080
266	0.0086	0.0007	0.0079
267	0.0086	0.0007	0.0079
268	0.0085	0.0007	0.0078
269	0.0084	0.0007	0.0077
270	0.0083	0.0007	0.0077
271	0.0083	0.0007	0.0076
272	0.0082	0.0007	0.0076
273	0.0082	0.0007	0.0075
274	0.0081	0.0007	0.0074
275	0.0080	0.0006	0.0074
276	0.0080	0.0006	0.0073
277	0.0079	0.0006	0.0073
278	0.0078	0.0006	0.0072
279	0.0078	0.0006	0.0072
280	0.0077	0.0006	0.0071
281	0.0077	0.0006	0.0071
282	0.0076	0.0006	0.0070
283	0.0076	0.0006	0.0070
284	0.0075	0.0006	0.0069
285	0.0075	0.0006	0.0069
286	0.0074	0.0006	0.0068
287	0.0074	0.0006	0.0068
288	0.0073	0.0006	0.0067

Total soil rain loss = 0.39(In)
Total effective rainfall = 5.24(In)
Peak flow rate in flood hydrograph = 9.70(CFS)

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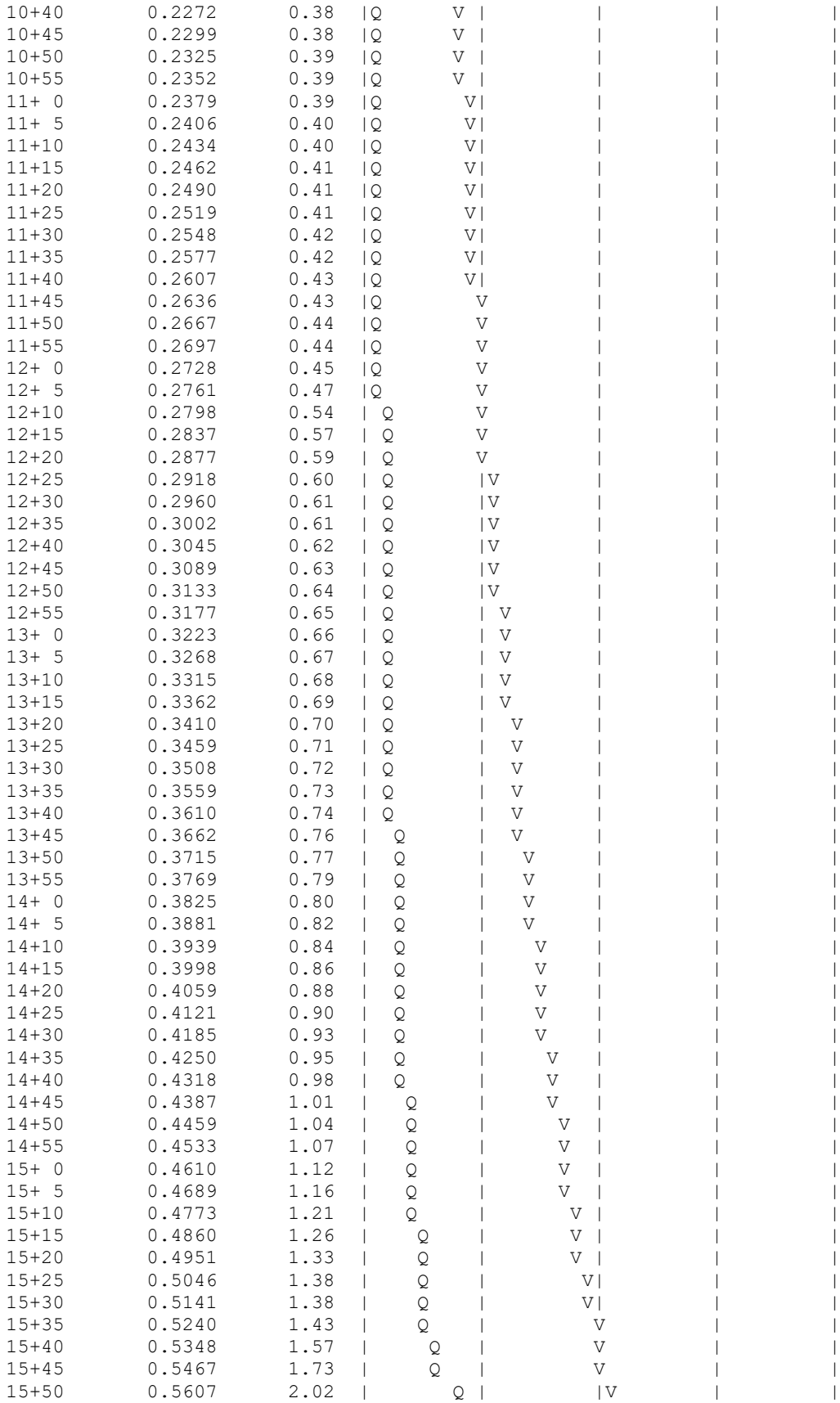
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

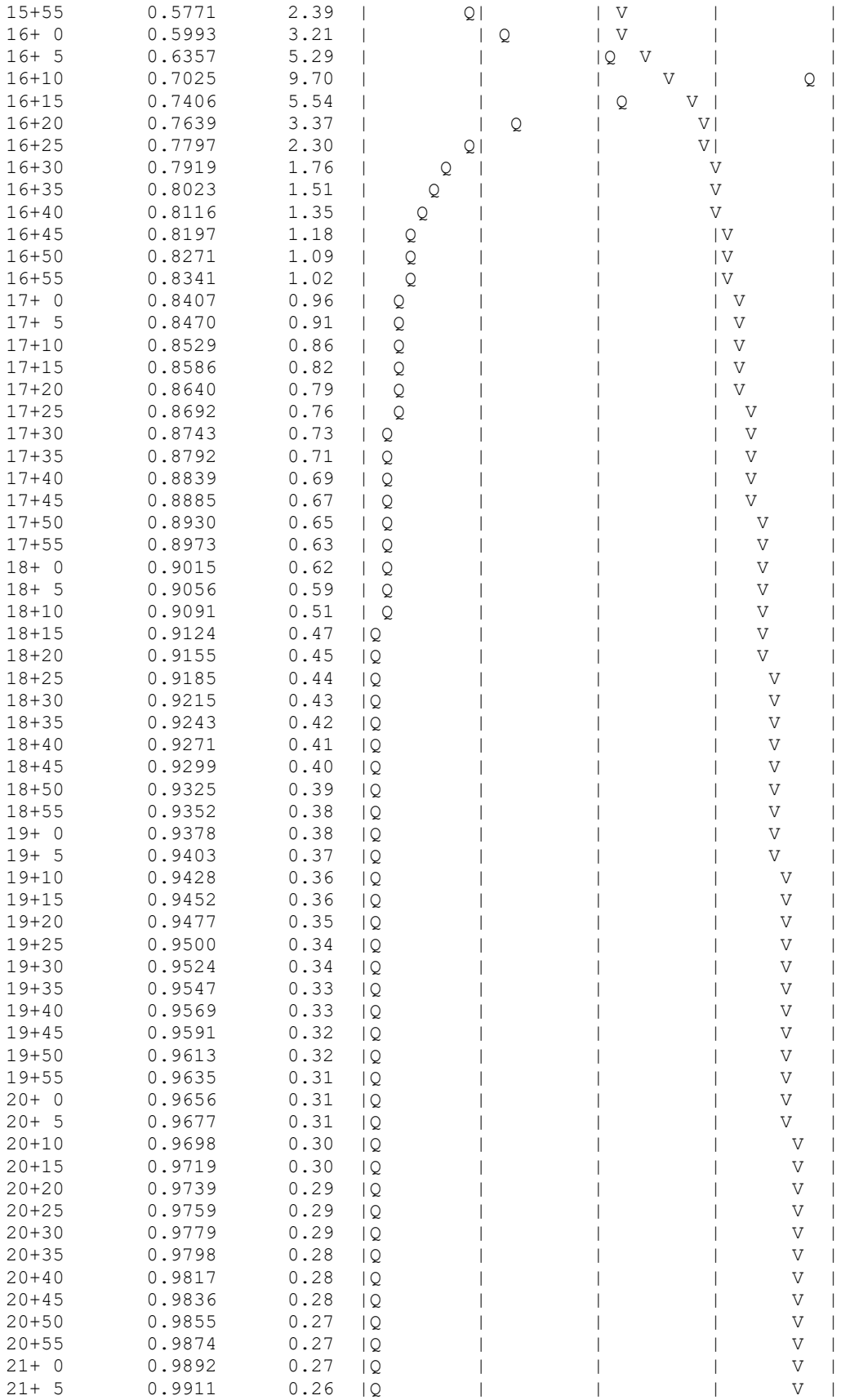
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q	|	|	|	|

0+10	0.0010	0.12	Q	|	|	|	|
0+15	0.0021	0.17	Q	|	|	|	|
0+20	0.0034	0.18	Q	|	|	|	|
0+25	0.0047	0.19	Q	|	|	|	|
0+30	0.0061	0.19	Q	|	|	|	|
0+35	0.0074	0.20	Q	|	|	|	|
0+40	0.0088	0.20	Q	|	|	|	|
0+45	0.0101	0.20	Q	|	|	|	|
0+50	0.0115	0.20	Q	|	|	|	|
0+55	0.0129	0.20	Q	|	|	|	|
1+ 0	0.0143	0.20	Q	|	|	|	|
1+ 5	0.0157	0.20	Q	|	|	|	|
1+10	0.0171	0.20	Q	|	|	|	|
1+15	0.0184	0.20	Q	|	|	|	|
1+20	0.0199	0.20	Q	|	|	|	|
1+25	0.0213	0.20	Q	|	|	|	|
1+30	0.0227	0.20	Q	|	|	|	|
1+35	0.0241	0.21	Q	|	|	|	|
1+40	0.0255	0.21	Q	|	|	|	|
1+45	0.0269	0.21	QV	|	|	|	|
1+50	0.0284	0.21	QV	|	|	|	|
1+55	0.0298	0.21	QV	|	|	|	|
2+ 0	0.0312	0.21	QV	|	|	|	|
2+ 5	0.0327	0.21	QV	|	|	|	|
2+10	0.0341	0.21	QV	|	|	|	|
2+15	0.0356	0.21	QV	|	|	|	|
2+20	0.0371	0.21	QV	|	|	|	|
2+25	0.0385	0.21	QV	|	|	|	|
2+30	0.0400	0.21	QV	|	|	|	|
2+35	0.0415	0.21	QV	|	|	|	|
2+40	0.0430	0.22	QV	|	|	|	|
2+45	0.0445	0.22	QV	|	|	|	|
2+50	0.0460	0.22	QV	|	|	|	|
2+55	0.0475	0.22	QV	|	|	|	|
3+ 0	0.0490	0.22	QV	|	|	|	|
3+ 5	0.0505	0.22	QV	|	|	|	|
3+10	0.0520	0.22	QV	|	|	|	|
3+15	0.0536	0.22	Q V	|	|	|	|
3+20	0.0551	0.22	Q V	|	|	|	|
3+25	0.0566	0.22	Q V	|	|	|	|
3+30	0.0582	0.22	Q V	|	|	|	|
3+35	0.0597	0.23	Q V	|	|	|	|
3+40	0.0613	0.23	Q V	|	|	|	|
3+45	0.0629	0.23	Q V	|	|	|	|
3+50	0.0644	0.23	Q V	|	|	|	|
3+55	0.0660	0.23	Q V	|	|	|	|
4+ 0	0.0676	0.23	Q V	|	|	|	|
4+ 5	0.0692	0.23	Q V	|	|	|	|
4+10	0.0708	0.23	Q V	|	|	|	|
4+15	0.0724	0.23	Q V	|	|	|	|
4+20	0.0740	0.23	Q V	|	|	|	|
4+25	0.0756	0.24	Q V	|	|	|	|
4+30	0.0773	0.24	Q V	|	|	|	|
4+35	0.0789	0.24	Q V	|	|	|	|
4+40	0.0805	0.24	Q V	|	|	|	|
4+45	0.0822	0.24	Q V	|	|	|	|
4+50	0.0838	0.24	Q V	|	|	|	|
4+55	0.0855	0.24	Q V	|	|	|	|
5+ 0	0.0872	0.24	Q V	|	|	|	|
5+ 5	0.0889	0.24	Q V	|	|	|	|
5+10	0.0906	0.25	Q V	|	|	|	|
5+15	0.0923	0.25	Q V	|	|	|	|
5+20	0.0940	0.25	Q V	|	|	|	|

5+25	0.0957	0.25	Q V	|	|	|	|
5+30	0.0974	0.25	|Q V	|	|	|	|
5+35	0.0991	0.25	|Q V	|	|	|	|
5+40	0.1009	0.25	|Q V	|	|	|	|
5+45	0.1026	0.25	|Q V	|	|	|	|
5+50	0.1044	0.26	|Q V	|	|	|	|
5+55	0.1061	0.26	|Q V	|	|	|	|
6+ 0	0.1079	0.26	|Q V	|	|	|	|
6+ 5	0.1097	0.26	|Q V	|	|	|	|
6+10	0.1115	0.26	|Q V	|	|	|	|
6+15	0.1133	0.26	|Q V	|	|	|	|
6+20	0.1151	0.26	|Q V	|	|	|	|
6+25	0.1169	0.26	|Q V	|	|	|	|
6+30	0.1188	0.27	|Q V	|	|	|	|
6+35	0.1206	0.27	|Q V	|	|	|	|
6+40	0.1225	0.27	|Q V	|	|	|	|
6+45	0.1243	0.27	|Q V	|	|	|	|
6+50	0.1262	0.27	|Q V	|	|	|	|
6+55	0.1281	0.27	|Q V	|	|	|	|
7+ 0	0.1300	0.28	|Q V	|	|	|	|
7+ 5	0.1319	0.28	|Q V	|	|	|	|
7+10	0.1338	0.28	|Q V	|	|	|	|
7+15	0.1357	0.28	|Q V	|	|	|	|
7+20	0.1377	0.28	|Q V	|	|	|	|
7+25	0.1396	0.28	|Q V	|	|	|	|
7+30	0.1416	0.28	|Q V	|	|	|	|
7+35	0.1436	0.29	|Q V	|	|	|	|
7+40	0.1455	0.29	|Q V	|	|	|	|
7+45	0.1475	0.29	|Q V	|	|	|	|
7+50	0.1496	0.29	|Q V	|	|	|	|
7+55	0.1516	0.29	|Q V	|	|	|	|
8+ 0	0.1536	0.30	|Q V	|	|	|	|
8+ 5	0.1557	0.30	|Q V	|	|	|	|
8+10	0.1577	0.30	|Q V	|	|	|	|
8+15	0.1598	0.30	|Q V	|	|	|	|
8+20	0.1619	0.30	|Q V	|	|	|	|
8+25	0.1640	0.31	|Q V	|	|	|	|
8+30	0.1661	0.31	|Q V	|	|	|	|
8+35	0.1682	0.31	|Q V	|	|	|	|
8+40	0.1704	0.31	|Q V	|	|	|	|
8+45	0.1726	0.31	|Q V	|	|	|	|
8+50	0.1747	0.32	|Q V	|	|	|	|
8+55	0.1769	0.32	|Q V	|	|	|	|
9+ 0	0.1791	0.32	|Q V	|	|	|	|
9+ 5	0.1814	0.32	|Q V	|	|	|	|
9+10	0.1836	0.33	|Q V	|	|	|	|
9+15	0.1859	0.33	|Q V	|	|	|	|
9+20	0.1881	0.33	|Q V	|	|	|	|
9+25	0.1904	0.33	|Q V	|	|	|	|
9+30	0.1927	0.34	|Q V	|	|	|	|
9+35	0.1951	0.34	|Q V	|	|	|	|
9+40	0.1974	0.34	|Q V	|	|	|	|
9+45	0.1998	0.34	|Q V	|	|	|	|
9+50	0.2022	0.35	|Q V	|	|	|	|
9+55	0.2046	0.35	|Q V	|	|	|	|
10+ 0	0.2070	0.35	|Q V	|	|	|	|
10+ 5	0.2095	0.36	|Q V	|	|	|	|
10+10	0.2119	0.36	|Q V	|	|	|	|
10+15	0.2144	0.36	|Q V	|	|	|	|
10+20	0.2169	0.37	|Q V	|	|	|	|
10+25	0.2195	0.37	|Q V	|	|	|	|
10+30	0.2220	0.37	|Q V	|	|	|	|
10+35	0.2246	0.37	|Q V	|	|	|	|





21+10	0.9929	0.26	|Q	|	|	|	V |
21+15	0.9946	0.26	|Q	|	|	|	V |
21+20	0.9964	0.26	|Q	|	|	|	V |
21+25	0.9982	0.25	|Q	|	|	|	V |
21+30	0.9999	0.25	|Q	|	|	|	V |
21+35	1.0016	0.25	Q	|	|	|	V |
21+40	1.0033	0.25	Q	|	|	|	V |
21+45	1.0050	0.24	Q	|	|	|	V |
21+50	1.0067	0.24	Q	|	|	|	V |
21+55	1.0083	0.24	Q	|	|	|	V |
22+ 0	1.0099	0.24	Q	|	|	|	V |
22+ 5	1.0116	0.24	Q	|	|	|	V |
22+10	1.0132	0.23	Q	|	|	|	V |
22+15	1.0148	0.23	Q	|	|	|	V |
22+20	1.0163	0.23	Q	|	|	|	V |
22+25	1.0179	0.23	Q	|	|	|	V |
22+30	1.0195	0.23	Q	|	|	|	V |
22+35	1.0210	0.22	Q	|	|	|	V |
22+40	1.0225	0.22	Q	|	|	|	V|
22+45	1.0241	0.22	Q	|	|	|	V|
22+50	1.0256	0.22	Q	|	|	|	V|
22+55	1.0271	0.22	Q	|	|	|	V|
23+ 0	1.0285	0.22	Q	|	|	|	V|
23+ 5	1.0300	0.21	Q	|	|	|	V|
23+10	1.0315	0.21	Q	|	|	|	V|
23+15	1.0329	0.21	Q	|	|	|	V|
23+20	1.0343	0.21	Q	|	|	|	V|
23+25	1.0358	0.21	Q	|	|	|	V|
23+30	1.0372	0.21	Q	|	|	|	V|
23+35	1.0386	0.20	Q	|	|	|	V|
23+40	1.0400	0.20	Q	|	|	|	V|
23+45	1.0414	0.20	Q	|	|	|	V|
23+50	1.0428	0.20	Q	|	|	|	V|
23+55	1.0441	0.20	Q	|	|	|	V|
24+ 0	1.0455	0.20	Q	|	|	|	V|
24+ 5	1.0467	0.17	Q	|	|	|	V|
24+10	1.0472	0.07	Q	|	|	|	V|
24+15	1.0474	0.03	Q	|	|	|	V|
24+20	1.0475	0.01	Q	|	|	|	V|
24+25	1.0475	0.00	Q	|	|	|	V|
24+30	1.0475	0.00	Q	|	|	|	V|
24+35	1.0475	0.00	Q	|	|	|	V

APPENDIX E

CATCH BASIN CALCULATIONS

CATCH BASIN SUMMARY TABLE
MILL CREEK DRIVE

CATCH BASIN	FLOW-BY/ SUMP	STREET NAME	CENTERLINE STATION	25-YEAR FLOW (CFS)	REQUIRED WIDTH (FT)	ACTUAL WIDTH (FT)	COMMENT
1	FLOW-BY	STREET 'B'	12+41.03	0.19	1.8	3.5	APPROACH GRADE 10.5%
2	FLOW-BY	STREET 'A'	11+41.84	0.38	3.5	3.5	APPROACH GRADE 10.0%
3	FLOW-BY	STREET 'A'	10+58.03	0.25	2.3	3.5	APPROACH GRADE 11.3%
GRATE INLET	**FLOW-BY/ SUMP**	**STREET NAME**	**CENTERLINE STATION**	**25-YEAR FLOW (CFS)**	**SPREAD WIDTH (FT)**	**DEPTH (INCH)**	**COMMENT**
1	SUMP	TURNOUT	10+55.02	0.27	1.0	1.1	
2	FLOWBY	STREET 'A'	10+55.05	0.19	1.3	1.2	APPROACH GRADE 3.3%
3	SUMP	STREET 'C'	11+63.34	0.28	1.0	1.2	
4	SUMP	STREET 'C'	11+63.34	0.12	0.8	0.6	
5	SUMP	STREET 'B'	13+81.35	0.50	1.3	1.7	
6	SUMP	STREET 'B'	13+84.12	0.68	1.5	2.1	

CATCH BASIN #1 (FLOW-BY)

```
**************************************************************************
 >>>>STREETFLOW MODEL INPUT INFORMATION<<<<
--------------------------------------------------------------------------
   CONSTANT STREET GRADE(FEET/FEET) = 0.105000
   CONSTANT STREET FLOW(CFS) =    0.19
   AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000
   CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) =   13.00
   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   11.00
   INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000
   OUTSIDE  STREET CROSSFALL(DECIMAL) = 0.020000
   CONSTANT SYMMETRICAL CURB HEIGHT(FEET) =   0.50
   CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) =   2.00
   CONSTANT SYMMETRICAL GUTTER-LIP(FEET) =  0.03125
   CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) =  0.12500
   FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS
==========================================================================
   STREET FLOW MODEL RESULTS:
--------------------------------------------------------------------------
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.23
   PRODUCT OF DEPTH&VELOCITY =    0.97
==========================================================================

**************************************************************************
 >>>>FLOWBY CATCH BASIN INLET CAPACITY INPUT INFORMATION<<<<
--------------------------------------------------------------------------


   Curb Inlet Capacities are approximated based on the Bureau of
   Public Roads nomograph plots for flowby basins and sump basins.

   STREETFLOW(CFS) =    0.19
   GUTTER FLOWDEPTH(FEET) =  0.16
   BASIN LOCAL DEPRESSION(FEET) =  0.17

--------------------------------------------------------------------------
      FLOWBY BASIN ANALYSIS RESULTS:

    BASIN WIDTH    FLOW INTERCEPTION
       0.18         0.03
       0.50         0.07
       1.00         0.13
       1.50         0.17
       1.77         0.19
==========================================================================
```

USE W=3.5’

CATCH BASIN #2 (FLOW-BY)

```
**************************************************************************
 >>>>STREETFLOW MODEL INPUT INFORMATION<<<<
 --------------------------------------------------------------------------
   CONSTANT STREET GRADE(FEET/FEET) = 0.100000
   CONSTANT STREET FLOW(CFS) =    0.38
   AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000
   CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) =   13.00
   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   11.00
   INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000
   OUTSIDE  STREET CROSSFALL(DECIMAL) = 0.020000
   CONSTANT SYMMETRICAL CURB HEIGHT(FEET) =   0.50
   CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) =   2.00
   CONSTANT SYMMETRICAL GUTTER-LIP(FEET) =  0.03125
   CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) =  0.12500
   FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS
 ==========================================================================
   STREET FLOW MODEL RESULTS:
 --------------------------------------------------------------------------
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.08
   PRODUCT OF DEPTH&VELOCITY =    0.95
 ==========================================================================
----------------------------------------------------------------------------

   Curb Inlet Capacities are approximated based on the Bureau of
   Public Roads nomograph plots for flowby basins and sump basins.

   STREETFLOW(CFS) =    0.38
   GUTTER FLOWDEPTH(FEET) =  0.16
   BASIN LOCAL DEPRESSION(FEET) =  0.17

 --------------------------------------------------------------------------
       FLOWBY BASIN ANALYSIS RESULTS:

     BASIN WIDTH     FLOW INTERCEPTION
        0.35          0.05
        0.50          0.07
        1.00          0.14
        1.50          0.21
        2.00          0.26
        2.50          0.30
        3.00          0.34
        3.50          0.38
```

USE W=3.5’

CATCH BASIN #3 (FLOW-BY)

```
**************************************************************************
 >>>>STREETFLOW MODEL INPUT INFORMATION<<<<
 --------------------------------------------------------------------------
   CONSTANT STREET GRADE(FEET/FEET) = 0.011300
   CONSTANT STREET FLOW(CFS) =    0.25
   AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000
   CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) =   13.00
   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   11.00
   INTERIOR STREET CROSSFALL(DECIMAL) = 0.074000
   OUTSIDE  STREET CROSSFALL(DECIMAL) = 0.020000
   CONSTANT SYMMETRICAL CURB HEIGHT(FEET) =   0.50
   CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) =   2.00
   CONSTANT SYMMETRICAL GUTTER-LIP(FEET) =  0.03125
   CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) =  0.12500
   FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS
 ==========================================================================
   STREET FLOW MODEL RESULTS:
 --------------------------------------------------------------------------
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    2.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
   PRODUCT OF DEPTH&VELOCITY =    0.32
 ==========================================================================
**************************************************************************
 >>>>FLOWBY CATCH BASIN INLET CAPACITY INPUT INFORMATION<<<<
 --------------------------------------------------------------------------

   Curb Inlet Capacities are approximated based on the Bureau of
   Public Roads nomograph plots for flowby basins and sump basins.


   STREETFLOW(CFS) =    0.25
   GUTTER FLOWDEPTH(FEET) =  0.16
   BASIN LOCAL DEPRESSION(FEET) =  0.17

 --------------------------------------------------------------------------
       FLOWBY BASIN ANALYSIS RESULTS:

     BASIN WIDTH     FLOW INTERCEPTION
        0.23          0.03
        0.50          0.07
        1.00          0.14
        1.50          0.19
        2.00          0.23
        2.32          0.25
 ==========================================================================
```

USE W=3.5’

Worksheet for Grate Inlet In Sag - 1

Project Description	
Solve For	Spread

Input Data	
Discharge	0.27 cfs
Gutter Width	1.00 ft
Gutter Cross Slope	0.130 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	1.00 ft
Grate Length	1.0 ft
Local Depression	1.0 in
Local Depression Width	22.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Results	
Spread	1.0 ft
Depth	1.1 in
Gutter Depression	1.3 in
Total Depression	2.3 in
Open Grate Area	0.9 ft²
Active Grate Weir Length	3.0 ft

Worksheet for Grate Inlet On Grade - 2

Project Description	
Solve For	Efficiency

Input Data	
Discharge	0.19 cfs
Slope	0.033 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.015
Grate Width	1.00 ft
Grate Length	1.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Options	
Grate Flow Option	Exclude None

Results	
Efficiency	98.49 %
Intercepted Flow	0.19 cfs
Bypass Flow	0.00 cfs
Spread	1.3 ft
Depth	1.2 in
Flow Area	0.1 ft²
Gutter Depression	1.4 in
Total Depression	1.4 in
Velocity	2.93 ft/s
Splash Over Velocity	5.66 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.071
Grate Flow Ratio	0.984
Active Grate Length	1.0 ft

Worksheet for Grate Inlet In Sag - 3

Project Description	
Solve For	Spread

Input Data	
Discharge	0.28 cfs
Gutter Width	1.00 ft
Gutter Cross Slope	0.130 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	1.00 ft
Grate Length	1.0 ft
Local Depression	1.0 in
Local Depression Width	22.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Results	
Spread	1.0 ft
Depth	1.2 in
Gutter Depression	1.3 in
Total Depression	2.3 in
Open Grate Area	0.9 ft²
Active Grate Weir Length	3.0 ft

Worksheet for Grate Inlet In Sag - 4

Project Description	
Solve For	Spread

Input Data	
Discharge	0.12 cfs
Gutter Width	1.00 ft
Gutter Cross Slope	0.130 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	1.00 ft
Grate Length	1.0 ft
Local Depression	1.0 in
Local Depression Width	22.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Results	
Spread	0.8 ft
Depth	0.6 in
Gutter Depression	1.3 in
Total Depression	2.3 in
Open Grate Area	0.9 ft²
Active Grate Weir Length	3.0 ft

Worksheet for Grate Inlet In Sag - 5

Project Description	
Solve For	Spread

Input Data	
Discharge	0.50 cfs
Gutter Width	1.00 ft
Gutter Cross Slope	0.130 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	1.00 ft
Grate Length	1.0 ft
Local Depression	1.0 in
Local Depression Width	22.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Results	
Spread	1.3 ft
Depth	1.7 in
Gutter Depression	1.3 in
Total Depression	2.3 in
Open Grate Area	0.9 ft²
Active Grate Weir Length	3.0 ft

Worksheet for Grate Inlet In Sag - 6

Project Description	
Solve For	Spread

Input Data	
Discharge	0.68 cfs
Gutter Width	1.00 ft
Gutter Cross Slope	0.130 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	1.00 ft
Grate Length	1.0 ft
Local Depression	1.0 in
Local Depression Width	22.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Results	
Spread	1.5 ft
Depth	2.1 in
Gutter Depression	1.3 in
Total Depression	2.3 in
Open Grate Area	0.9 ft²
Active Grate Weir Length	3.0 ft

APPENDIX F

PARKWAY CULVERT CALCULATIONS

PARKWAY CULVERT CALCULATIONS

SYSTEM A – 15+99.23 MILL CREEK DR (TYPE B; OUTLET V<10 FPS)

```
**************************************************************************
 >>>>CHANNEL INPUT INFORMATION<<<<
 --------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =   0.33
   CHANNEL Z1(HORIZONTAL/VERTICAL) =    0.00
        Z2(HORIZONTAL/VERTICAL) =    0.00
   CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.020000
   UNIFORM FLOW(CFS) =       2.80
   MANNINGS FRICTION FACTOR = 0.0150
==========================================================================
   NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
   >>>>> BASEWIDTH(FEET) =    1.60
   FLOW TOP-WIDTH(FEET) =       1.60
   FLOW AREA(SQUARE FEET) =         0.53
   HYDRAULIC DEPTH(FEET) =    0.33
   FLOW AVERAGE VELOCITY(FEET/SEC.) =    5.31
   UNIFORM FROUDE NUMBER =    1.630
   PRESSURE + MOMENTUM(POUNDS) =         34.26
   AVERAGED VELOCITY HEAD(FEET) =     0.439
   SPECIFIC ENERGY(FEET) =     0.769
==========================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
   CRITICAL FLOW TOP-WIDTH(FEET) =       1.60
   CRITICAL FLOW AREA(SQUARE FEET) =         0.73
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =    0.46
   CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =    3.84
   CRITICAL DEPTH(FEET) =    0.46
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         31.23
   AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =     0.229
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =     0.686
==========================================================================
```

USE SPAN=2’

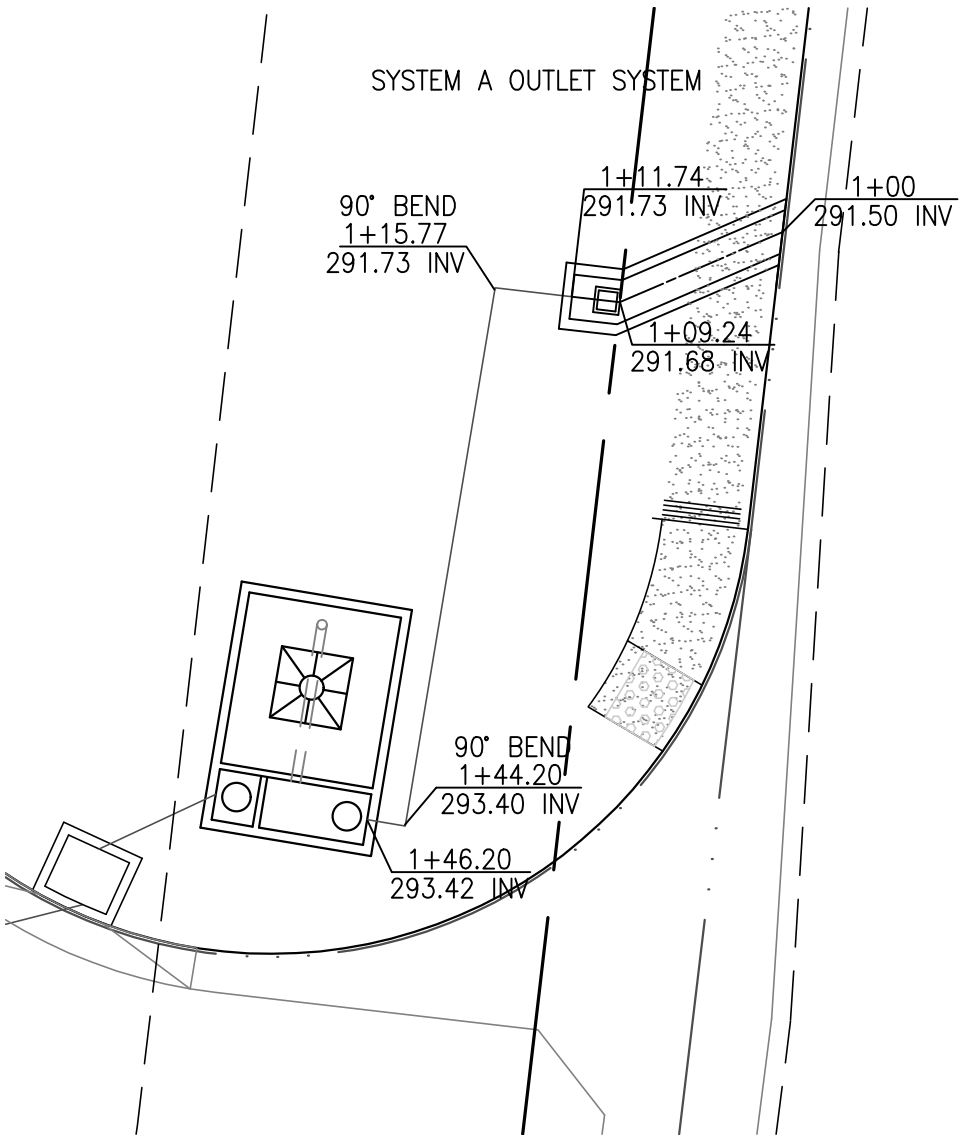
SYSTEM B – 13+92.80 MILL CREEK DR (TYPE A OUTLET; V>10 FPS)

```
**************************************************************************
 >>>>CHANNEL INPUT INFORMATION<<<<
--------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =   0.33
   CHANNEL Z1(HORIZONTAL/VERTICAL) =    0.00
        Z2(HORIZONTAL/VERTICAL) =    0.00
   CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.020000
   UNIFORM FLOW(CFS) =       4.30
   MANNINGS FRICTION FACTOR = 0.0150
==========================================================================
   NORMAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
   >>>>> BASEWIDTH(FEET) =    2.30
   FLOW TOP-WIDTH(FEET) =       2.30
   FLOW AREA(SQUARE FEET) =         0.76
   HYDRAULIC DEPTH(FEET) =    0.33
   FLOW AVERAGE VELOCITY(FEET/SEC.) =    5.66
   UNIFORM FROUDE NUMBER =    1.735
   PRESSURE + MOMENTUM(POUNDS) =        54.95
   AVERAGED VELOCITY HEAD(FEET) =     0.497
   SPECIFIC ENERGY(FEET) =     0.827
==========================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
--------------------------------------------------------------------------
   CRITICAL FLOW TOP-WIDTH(FEET) =       2.30
   CRITICAL FLOW AREA(SQUARE FEET) =         1.10
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =    0.48
   CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =    3.92
   CRITICAL DEPTH(FEET) =    0.48
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        48.96
   AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =     0.239
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =     0.715
==========================================================================
```

USE SPAN=2.5’

APPENDIX G

HYDRAULIC CALCULATIONS


SYSTEM A OUTLET SYSTEM
1+11.74
291.73 INV
1+00
291.50 INV
90° BEND
1+15.77
291.73 INV
1+09.24
291.68 INV
90° BEND
1+44.20
293.40 INV
1+46.20
293.42 INV

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	2	0	.000	.330	2.000			.00										
CD	2	4	1		1.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

MILL CREEK DEVELOPMENT

HEADING LINE NO 2 IS -

SYSTEM A OUTLET HYDRAULICS

HEADING LINE NO 3 IS -

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	291.500	1	291.500

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	109.240	291.680	1	.015	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	111.740	291.730	2	.013	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	115.770	291.730	2	.010	.000	.000	-90.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	144.200	293.400	2	.010	.000	.000	-90.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	146.200	293.420	2	.010	.000	.000	.000	0

ELEMENT NO 7 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	146.200	293.420	2	293.420

Program Package Serial Number: 1881

WATER SURFACE PROFILE LISTING Date:10- 9-2025 Time: 9:38:34

MILL CREEK DEVELOPMENT
SYSTEM A OUTLET HYDRAULICS

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/Dia.-FT / X-Fall	Base Wt or I.D. / ZR	ZL	No Wth Prs/Pip / Type Ch
100.000	291.500	.200	291.700	2.80	7.01	.76	292.46	.00	.39	2.00	.330	2.000	.00	0 .0
.155	.0195				.0553	.01	.20	2.76	.28	.015	.00	.00		RECTANG
100.155	291.503	.198	291.701	2.80	7.06	.77	292.48	.00	.39	2.00	.330	2.000	.00	0 .0
1.666	.0195				.0604	.10	.20	2.80	.28	.015	.00	.00		RECTANG
101.821	291.535	.189	291.724	2.80	7.41	.85	292.58	.00	.39	2.00	.330	2.000	.00	0 .0
1.508	.0195				.0701	.11	.19	3.00	.28	.015	.00	.00		RECTANG
103.329	291.565	.180	291.745	2.80	7.77	.94	292.68	.00	.39	2.00	.330	2.000	.00	0 .0
1.378	.0195				.0814	.11	.18	3.23	.28	.015	.00	.00		RECTANG
104.707	291.592	.172	291.764	2.80	8.15	1.03	292.79	.00	.39	2.00	.330	2.000	.00	0 .0
1.267	.0195				.0946	.12	.17	3.46	.28	.015	.00	.00		RECTANG
105.973	291.616	.164	291.780	2.80	8.55	1.13	292.91	.00	.39	2.00	.330	2.000	.00	0 .0
1.170	.0195				.1099	.13	.16	3.72	.28	.015	.00	.00		RECTANG
107.144	291.639	.156	291.795	2.80	8.96	1.25	293.04	.00	.39	2.00	.330	2.000	.00	0 .0
1.086	.0195				.1277	.14	.16	4.00	.28	.015	.00	.00		RECTANG
108.230	291.660	.149	291.809	2.80	9.40	1.37	293.18	.00	.39	2.00	.330	2.000	.00	0 .0
1.010	.0195				.1484	.15	.15	4.29	.28	.015	.00	.00		RECTANG
109.240	291.680	.142	291.822	2.80	9.86	1.51	293.33	.00	.39	2.00	.330	2.000	.00	0 .0
TRANS STR	.0200				.0885	.22	.14	4.61		.013	.00	.00		RECTANG

MILL CREEK DEVELOPMENT
SYSTEM A OUTLET HYDRAULICS

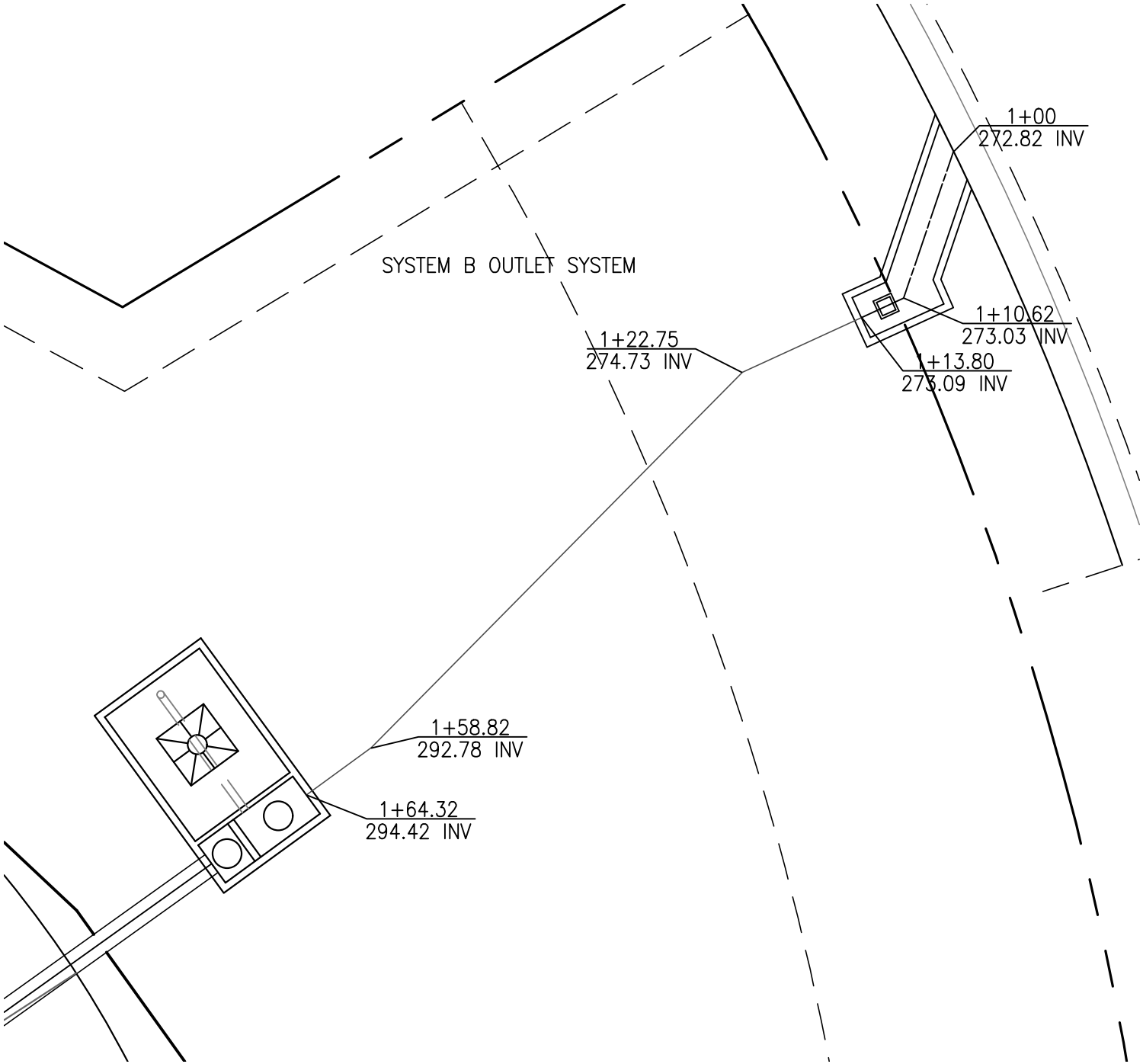
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
111.740	291.730	.395	292.125	2.80	9.72	1.47	293.59	.00	.72	.98	1.000	.000	.00	1 .0
.363	.0000					.0340	.01	.39	3.15	.00	.010	.00	.00	PIPE
112.103	291.730	.393	292.123	2.80	9.77	1.48	293.60	.00	.72	.98	1.000	.000	.00	1 .0
3.667	.0000					.0367	.13	.39	3.18	.00	.010	.00	.00	PIPE
115.770	291.730	.379	292.110	2.80	10.24	1.63	293.74	.00	.72	.97	1.000	.000	.00	1 .0
5.201	.0587					.0371	.19	.38	3.40	.34	.010	.00	.00	PIPE
120.971	292.036	.391	292.426	2.80	9.85	1.51	293.93	.00	.72	.98	1.000	.000	.00	1 .0
4.771	.0587					.0330	.16	.39	3.22	.34	.010	.00	.00	PIPE
125.742	292.316	.405	292.721	2.80	9.40	1.37	294.09	.00	.72	.98	1.000	.000	.00	1 .0
3.690	.0587					.0290	.11	.40	3.01	.34	.010	.00	.00	PIPE
129.433	292.533	.419	292.952	2.80	8.96	1.25	294.20	.00	.72	.99	1.000	.000	.00	1 .0
2.936	.0587					.0254	.07	.42	2.81	.34	.010	.00	.00	PIPE
132.368	292.705	.435	293.140	2.80	8.54	1.13	294.27	.00	.72	.99	1.000	.000	.00	1 .0
2.387	.0587					.0223	.05	.43	2.62	.34	.010	.00	.00	PIPE
134.756	292.845	.451	293.296	2.80	8.14	1.03	294.33	.00	.72	1.00	1.000	.000	.00	1 .0
1.965	.0587					.0196	.04	.45	2.44	.34	.010	.00	.00	PIPE
136.721	292.961	.468	293.428	2.80	7.77	.94	294.36	.00	.72	1.00	1.000	.000	.00	1 .0
1.628	.0587					.0173	.03	.47	2.28	.34	.010	.00	.00	PIPE

MILL CREEK DEVELOPMENT
SYSTEM A OUTLET HYDRAULICS

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
138.349	293.056	.485	293.542	2.80	7.40	.85	294.39	.00	.72	1.00	1.000	.000	.00	1 .0
1.353	.0587					.0152	.02	.49	2.12	.34	.010	.00	.00	PIPE
139.702	293.136	.504	293.640	2.80	7.06	.77	294.41	.00	.72	1.00	1.000	.000	.00	1 .0
1.126	.0587					.0134	.02	.50	1.98	.34	.010	.00	.00	PIPE
140.827	293.202	.523	293.725	2.80	6.73	.70	294.43	.00	.72	1.00	1.000	.000	.00	1 .0
.928	.0587					.0118	.01	.52	1.84	.34	.010	.00	.00	PIPE
141.755	293.256	.544	293.800	2.80	6.42	.64	294.44	.00	.72	1.00	1.000	.000	.00	1 .0
.760	.0587					.0104	.01	.54	1.71	.34	.010	.00	.00	PIPE
142.515	293.301	.565	293.866	2.80	6.12	.58	294.45	.00	.72	.99	1.000	.000	.00	1 .0
.611	.0587					.0092	.01	.57	1.59	.34	.010	.00	.00	PIPE
143.126	293.337	.588	293.925	2.80	5.83	.53	294.45	.00	.72	.98	1.000	.000	.00	1 .0
.477	.0587					.0081	.00	.59	1.47	.34	.010	.00	.00	PIPE
143.603	293.365	.612	293.976	2.80	5.56	.48	294.46	.00	.72	.97	1.000	.000	.00	1 .0
.355	.0587					.0072	.00	.61	1.36	.34	.010	.00	.00	PIPE
143.958	293.386	.637	294.023	2.80	5.30	.44	294.46	.00	.72	.96	1.000	.000	.00	1 .0
.242	.0587					.0064	.00	.64	1.26	.34	.010	.00	.00	PIPE
144.200	293.400	.664	294.064	2.80	5.06	.40	294.46	.00	.72	.94	1.000	.000	.00	1 .0
1.401	.0100					.0058	.01	.66	1.16	.56	.010	.00	.00	PIPE

MILL CREEK DEVELOPMENT
SYSTEM A OUTLET HYDRAULICS

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
145.601	293.414	.686	294.100	2.80	4.88	.37	294.47	.00	.72	.93	1.000	.000	.00	1 .0
.599	.0100					.0052	.00	.69	1.09	.56	.010	.00	.00	PIPE
146.200	293.420	.717	294.137	2.80	4.64	.33	294.47	.00	.72	.90	1.000	.000	.00	1 .0


SYSTEM B OUTLET SYSTEM
1+00
272.82 INV
1+10.62
273.03 INV
1+13.80
273.09 INV
1+22.75
274.73 INV
1+58.82
292.78 INV
1+64.32
294.42 INV

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	2	2	0	.000	.330	2.500			.00										
CD	3	4	1		1.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

MILL CREEK DEVELOPMENT

HEADING LINE NO 2 IS -

SYSTEM B OUTLET HYDRAULICS

HEADING LINE NO 3 IS -

BY KAM 100925

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	100.000	272.820	2	272.820

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	110.620	273.030	2	.015	13.522	-45.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	113.800	273.090	3	.015	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	122.750	274.730	3	.010	.000	.000	-11.250	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	158.820	292.780	3	.010	.000	.000	11.250	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	164.320	294.420	3	.010	.000	.000	.000	0

ELEMENT NO 7 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	164.320	294.420	3	294.420

Program Package Serial Number: 1881

WATER SURFACE PROFILE LISTING Date:10- 9-2025 Time: 9:35:35

MILL CREEK DEVELOPMENT
SYSTEM B OUTLET HYDRAULICS
BY KAM 100925

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
L/Elem	Ch Slope													
100.000	272.820	.170	272.990	4.30	10.10	1.58	274.57	.59	.45	2.50	.330	2.500	.00	0 .0
.144	.0198					.1316	.02	.76	4.31	.31	.015	.00	.00	RECTANG
100.144	272.823	.169	272.992	4.30	10.16	1.60	274.59	.59	.45	2.50	.330	2.500	.00	0 .0
1.229	.0198					.1437	.18	.76	4.35	.31	.015	.00	.00	RECTANG
101.372	272.847	.161	273.009	4.30	10.65	1.76	274.77	.65	.45	2.50	.330	2.500	.00	0 .0
1.144	.0198					.1672	.19	.81	4.67	.31	.015	.00	.00	RECTANG
102.516	272.870	.154	273.024	4.30	11.17	1.94	274.96	.72	.45	2.50	.330	2.500	.00	0 .0
1.067	.0198					.1947	.21	.87	5.02	.31	.015	.00	.00	RECTANG
103.583	272.891	.147	273.038	4.30	11.72	2.13	275.17	.79	.45	2.50	.330	2.500	.00	0 .0
.997	.0198					.2267	.23	.94	5.39	.31	.015	.00	.00	RECTANG
104.580	272.911	.140	273.050	4.30	12.29	2.34	275.40	.87	.45	2.50	.330	2.500	.00	0 .0
.933	.0198					.2640	.25	1.01	5.79	.31	.015	.00	.00	RECTANG
105.513	272.929	.133	273.062	4.30	12.89	2.58	275.64	.95	.45	2.50	.330	2.500	.00	0 .0
.875	.0198					.3076	.27	1.09	6.22	.31	.015	.00	.00	RECTANG
106.388	272.946	.127	273.074	4.30	13.52	2.84	275.91	1.05	.45	2.50	.330	2.500	.00	0 .0
.820	.0198					.3584	.29	1.18	6.68	.31	.015	.00	.00	RECTANG
107.208	272.963	.121	273.084	4.30	14.18	3.12	276.20	1.15	.45	2.50	.330	2.500	.00	0 .0
.770	.0198					.4178	.32	1.28	7.17	.31	.015	.00	.00	RECTANG

MILL CREEK DEVELOPMENT
SYSTEM B OUTLET HYDRAULICS
BY KAM 100925

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
107.978	272.978	.116	273.093	4.30	14.87	3.43	276.53	1.27	.45	2.50	.330	2.500	.00	0 .0
.723	.0198					.4871	.35	1.39	7.70	.31	.015	.00	.00	RECTANG
108.701	272.992	.110	273.102	4.30	15.59	3.78	276.88	1.40	.45	2.50	.330	2.500	.00	0 .0
.679	.0198					.5680	.39	1.51	8.28	.31	.015	.00	.00	RECTANG
109.381	273.005	.105	273.111	4.30	16.36	4.15	277.26	1.54	.45	2.50	.330	2.500	.00	0 .0
.639	.0198					.6625	.42	1.64	8.89	.31	.015	.00	.00	RECTANG
110.020	273.018	.100	273.118	4.30	17.15	4.57	277.69	1.69	.45	2.50	.330	2.500	.00	0 .0
.600	.0198					.7729	.46	1.79	9.55	.31	.015	.00	.00	RECTANG
110.620	273.030	.096	273.126	4.30	17.99	5.03	278.15	.00	.45	2.50	.330	2.500	.00	0 .0
TRANS STR	.0189					.7842	2.49	.10	10.25		.015	.00	.00	RECTANG
113.800	273.090	.272	273.362	4.30	24.82	9.56	282.92	.00	.87	.89	1.000	.000	.00	1 .0
3.937	.1832					.3435	1.35	.27	9.91	.32	.010	.00	.00	PIPE
117.737	273.811	.266	274.077	4.30	25.67	10.24	284.31	.00	.87	.88	1.000	.000	.00	1 .0
5.013	.1832					.3857	1.93	.27	10.39	.32	.010	.00	.00	PIPE
122.750	274.730	.257	274.987	4.30	26.93	11.26	286.25	.00	.87	.87	1.000	.000	.00	1 .0
.344	.5004					.4104	.14	.26	11.10	.24	.010	.00	.00	PIPE
123.094	274.902	.257	275.159	4.30	26.88	11.22	286.38	.00	.87	.87	1.000	.000	.00	1 .0
8.663	.5004					.3837	3.32	.26	11.07	.24	.010	.00	.00	PIPE

MILL CREEK DEVELOPMENT
SYSTEM B OUTLET HYDRAULICS
BY KAM 100925

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch	L/Elem / Ch Slope
131.757	279.237	.266	279.503	4.30	25.63	10.20	289.70	.00	.87	.88	1.000	.000	.00	1	.0
						.3357	1.87	.27	10.37	.24	.010	.00	.00	PIPE	5.573 .5004
137.330	282.026	.275	282.302	4.30	24.44	9.27	291.57	.00	.87	.89	1.000	.000	.00	1	.0
						.2937	1.18	.28	9.70	.24	.010	.00	.00	PIPE	4.032 .5004
141.363	284.044	.285	284.329	4.30	23.30	8.43	292.76	.00	.87	.90	1.000	.000	.00	1	.0
						.2571	.80	.29	9.08	.24	.010	.00	.00	PIPE	3.109 .5004
144.471	285.600	.295	285.895	4.30	22.22	7.66	293.56	.00	.87	.91	1.000	.000	.00	1	.0
						.2250	.56	.29	8.50	.24	.010	.00	.00	PIPE	2.493 .5004
146.964	286.847	.305	287.152	4.30	21.18	6.97	294.12	.00	.87	.92	1.000	.000	.00	1	.0
						.1970	.40	.31	7.95	.24	.010	.00	.00	PIPE	2.052 .5004
149.016	287.874	.316	288.190	4.30	20.20	6.33	294.52	.00	.87	.93	1.000	.000	.00	1	.0
						.1726	.30	.32	7.44	.24	.010	.00	.00	PIPE	1.722 .5004
150.738	288.736	.327	289.063	4.30	19.26	5.76	294.82	.00	.87	.94	1.000	.000	.00	1	.0
						.1512	.22	.33	6.96	.24	.010	.00	.00	PIPE	1.465 .5004
152.204	289.469	.339	289.808	4.30	18.36	5.23	295.04	.00	.87	.95	1.000	.000	.00	1	.0
						.1325	.17	.34	6.50	.24	.010	.00	.00	PIPE	1.261 .5004
153.465	290.100	.351	290.451	4.30	17.51	4.76	295.21	.00	.87	.95	1.000	.000	.00	1	.0
						.1161	.13	.35	6.08	.24	.010	.00	.00	PIPE	1.093 .5004

MILL CREEK DEVELOPMENT
SYSTEM B OUTLET HYDRAULICS
BY KAM 100925

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
154.557	290.647	.363	291.010	4.30	16.69	4.33	295.34	.00	.87	.96	1.000	.000	.00	1 .0
.954	.5004					.1018	.10	.36	5.68	.24	.010	.00	.00	PIPE
155.511	291.124	.376	291.500	4.30	15.91	3.93	295.43	.00	.87	.97	1.000	.000	.00	1 .0
.837	.5004					.0893	.07	.38	5.31	.24	.010	.00	.00	PIPE
156.348	291.543	.390	291.933	4.30	15.17	3.58	295.51	.00	.87	.98	1.000	.000	.00	1 .0
.736	.5004					.0783	.06	.39	4.96	.24	.010	.00	.00	PIPE
157.084	291.911	.404	292.315	4.30	14.47	3.25	295.57	.00	.87	.98	1.000	.000	.00	1 .0
.650	.5004					.0688	.04	.40	4.63	.24	.010	.00	.00	PIPE
157.735	292.237	.419	292.656	4.30	13.79	2.95	295.61	.00	.87	.99	1.000	.000	.00	1 .0
.575	.5004					.0604	.03	.42	4.32	.24	.010	.00	.00	PIPE
158.310	292.525	.434	292.959	4.30	13.15	2.69	295.64	.00	.87	.99	1.000	.000	.00	1 .0
.510	.5004					.0531	.03	.43	4.04	.24	.010	.00	.00	PIPE
158.820	292.780	.450	293.230	4.30	12.54	2.44	295.67	.00	.87	1.00	1.000	.000	.00	1 .0
.620	.2982					.0474	.03	.45	3.76	.28	.010	.00	.00	PIPE
159.440	292.965	.462	293.427	4.30	12.11	2.28	295.70	.00	.87	1.00	1.000	.000	.00	1 .0
.741	.2982					.0424	.03	.46	3.57	.28	.010	.00	.00	PIPE
160.180	293.186	.480	293.665	4.30	11.54	2.07	295.73	.00	.87	1.00	1.000	.000	.00	1 .0
.651	.2982					.0373	.02	.48	3.33	.28	.010	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING Date:10- 9-2025 Time: 9:35:35

MILL CREEK DEVELOPMENT
SYSTEM B OUTLET HYDRAULICS
BY KAM 100925

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
L/Elem	Ch Slope													
160.831	293.380	.498	293.878	4.30	11.00	1.88	295.76	.00	.87	1.00	1.000	.000	.00	1 .0
.572	.2982					.0329	.02	.50	3.10	.28	.010	.00	.00	PIPE
161.404	293.550	.517	294.068	4.30	10.49	1.71	295.78	.00	.87	1.00	1.000	.000	.00	1 .0
.503	.2982					.0290	.01	.52	2.89	.28	.010	.00	.00	PIPE
161.907	293.700	.537	294.238	4.30	10.00	1.55	295.79	.00	.87	1.00	1.000	.000	.00	1 .0
.441	.2982					.0255	.01	.54	2.69	.28	.010	.00	.00	PIPE
162.347	293.832	.558	294.390	4.30	9.54	1.41	295.80	.00	.87	.99	1.000	.000	.00	1 .0
.385	.2982					.0226	.01	.56	2.50	.28	.010	.00	.00	PIPE
162.733	293.947	.580	294.527	4.30	9.09	1.28	295.81	.00	.87	.99	1.000	.000	.00	1 .0
.335	.2982					.0199	.01	.58	2.32	.28	.010	.00	.00	PIPE
163.068	294.047	.604	294.651	4.30	8.67	1.17	295.82	.00	.87	.98	1.000	.000	.00	1 .0
.290	.2982					.0177	.01	.60	2.15	.28	.010	.00	.00	PIPE
163.358	294.133	.629	294.762	4.30	8.27	1.06	295.82	.00	.87	.97	1.000	.000	.00	1 .0
.248	.2982					.0157	.00	.63	1.99	.28	.010	.00	.00	PIPE
163.606	294.207	.655	294.862	4.30	7.88	.96	295.83	.00	.87	.95	1.000	.000	.00	1 .0
.209	.2982					.0139	.00	.66	1.83	.28	.010	.00	.00	PIPE
163.814	294.269	.684	294.953	4.30	7.52	.88	295.83	.00	.87	.93	1.000	.000	.00	1 .0
.173	.2982					.0124	.00	.68	1.69	.28	.010	.00	.00	PIPE

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MILL CREEK DEVELOPMENT
SYSTEM B OUTLET HYDRAULICS
BY KAM 100925

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
163.987	294.321	.714	295.035	4.30	7.17	.80	295.83	.00	.87	.90	1.000	.000	.00	1 .0
.138	.2982					.0111	.00	.71	1.55	.28	.010	.00	.00	PIPE
164.125	294.362	.747	295.109	4.30	6.83	.73	295.83	.00	.87	.87	1.000	.000	.00	1 .0
.103	.2982					.0099	.00	.75	1.42	.28	.010	.00	.00	PIPE
164.228	294.393	.783	295.176	4.30	6.52	.66	295.83	.00	.87	.82	1.000	.000	.00	1 .0
.067	.2982					.0090	.00	.78	1.28	.28	.010	.00	.00	PIPE
164.295	294.412	.824	295.236	4.30	6.21	.60	295.84	.00	.87	.76	1.000	.000	.00	1 .0
.025	.2982					.0082	.00	.82	1.15	.28	.010	.00	.00	PIPE
164.320	294.420	.872	295.292	4.30	5.92	.54	295.84	.00	.87	.67	1.000	.000	.00	1 .0