Appendix D Preliminary Hydrology Report

Appendix

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IRVINE HERITAGE COMMUNITY PARK
CITY OF IRVINE, ORANGE COUNTY, CALIFORNIA

PRELIMINARY HYDROLOGY REPORT

February 2023

Prepared by:

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1. INTRODUCTION

The following report is prepared to present the preliminary hydrology study completed for Irvine Heritage Community Park ("Project"). The objective of this study is to show the difference in Project runoff in existing and proposed development conditions.

The park is located on an ±84-acre site located in the City of Irvine, bounded by I-5 Freeway to the north, Yale Avenue to the east, Walnut Avenue to the South, and Escolar to the west. The site inclusive of the park includes recreational amenities, a library, a community center, a fine arts center, Irvine High School, and Orange County Fire Station 26.

The park improvements will serve the community's increasing needs for upgraded recreation, athletic, and education provisions. While portions of the park interface with Irvine High School, the high school's main campus is not undergoing redevelopment and thus is not part of the Project. However, hydrologic analyses include these unchanging areas for the purpose of maintaining consistency between pre- and post-Project areas.

2. HYDROLOGY METHODS

The hydrology study follows methods from the Orange County Hydrology Manual (October 1986) and will determine Project runoff for the 25-year and 100-year storm events. The study's runoff computations will use the rational method. Background of the hydrology study in terms of the software, rational method, subwatersheds, soils, time of concentration, and rainfall will be presented.

Software

The Advanced Engineering Software (AES) incorporates the rational method computations per the County Hydrology Manual. The software requires input for watershed characteristics (area, landuse, length, slope) and computes peak runoff for a specified storm frequency.

Rational Method

The rational method correlates rainfall intensity, runoff coefficient, and watershed area to peak runoff. The software computes runoff from the following relationship:

$Q = 0.90 \times (I - F_m) \times A$ for I greater than F_P
$Q = 0.90 \times a_i \times I \times A$ for I less than or equal to F_P

Where:

Q = runoff (cfs)
0.90 = calibration constant determined by an average fit between rational method and design storm unit hydrograph
$F_m = a_p \times F_p$ = loss rate of total watershed (in/hr)
I = rainfall intensity (in/hr)
F_p = infiltration rate for pervious areas (in/hr)
a_i = ratio of impervious area to total area (decimal fraction)
a_p = ratio of pervious area to total area (decimal fraction)

The value of loss rate for pervious area (F_p) is a function of Soil Group as follows:

Soil Group	A	B	C	D
F_p (in/hr)	0.40	0.30	0.25	0.20

Subwatersheds
The Project subwatersheds are delineated from existing aerial topography data from 2018. A watershed map for existing and proposed subwatershed boundaries is shown on **Exhibit 1** and **Exhibit 2**.

Soils
The Project watershed is classified as *Soil Group D* and assumes AMC II for the 25-year and AMC III for the 100-year.

Time of Concentration
The Project subwatershed delineations are considered initial subareas, and abide by the following limitations:

- Maximum length of 1,000 feet
- Maximum Area of 10 acres

For each subwatershed, an initial subarea time of concentration (T_c) is computed by the AES software using the Kirpich formula. The formula is based on subarea slope and development type.

Rainfall
The AES software includes built-in precipitation intensity curves based on the Orange County Hydrology Manual. The software requires the storm frequency to be specified.

3. HYDROLOGY RESULTS

A summary of 25-year and 100-year total runoff for existing and proposed conditions is presented in **Table 1** for the overall Project watershed. Additionally, a

more detailed summary of AES modeling input and output are tabulated in **Appendix A** for the delineated subwatersheds.

Table 1. Existing and Proposed Runoff

Condition	Area (ac)	Impervious	Q_{25} (cfs)	Q_{100} (cfs)
Existing	83.9	44.7%	239	307
Proposed	83.9	52.2%	240	308

The AES modeling results indicate the cumulative runoff for the overall Project watershed shows a negligible and insignificant change in runoff due to an approximately 7.5% (6.3 acre) increase in impervious cover for the proposed development. The negligible change is attributed to the high runoff potential for type D soils, high rainfall intensities for storms greater than the 10-year, and relatively short subwatershed travel times.

The AES modeling calculations are included in **Appendix B** for the 25-year and **Appendix C** for the 100-year.

4. CONCLUSION

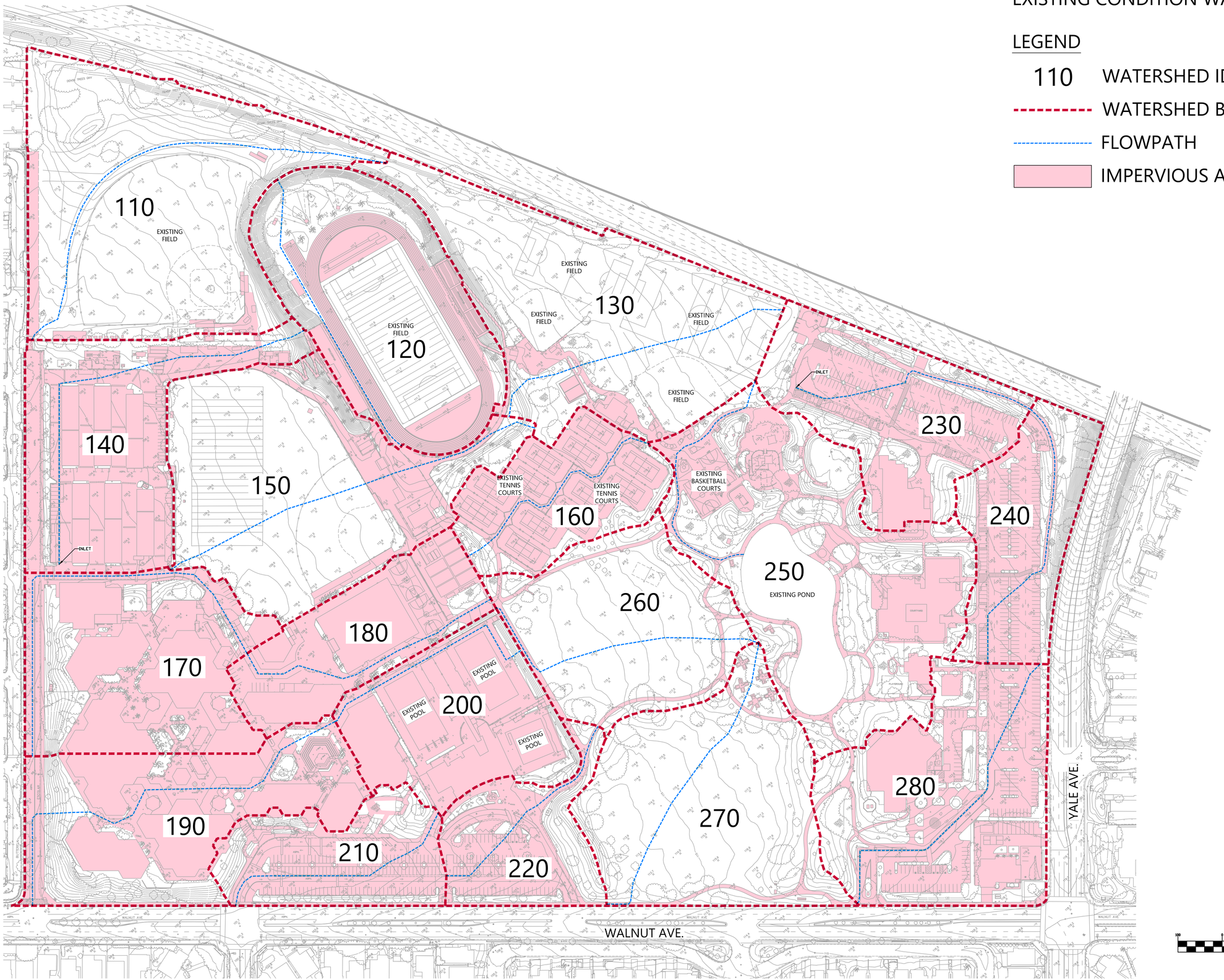
The hydrology study for Irvine Heritage Community Park demonstrates the proposed development does not generate a significant runoff increase in comparison to existing condition. Consequentially, the proposed Project runoff is expected to have no cumulative net impact to offsite stormdrain facilities.

5. EXHIBITS

Exhibit 1. Existing Condition Watershed Map

Exhibit 2. Proposed Condition Watershed Map

EXISTING CONDITION WATERSHED MAP



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APN 988-471-02
14301 YALE AVE, IRVINE, CA 92604

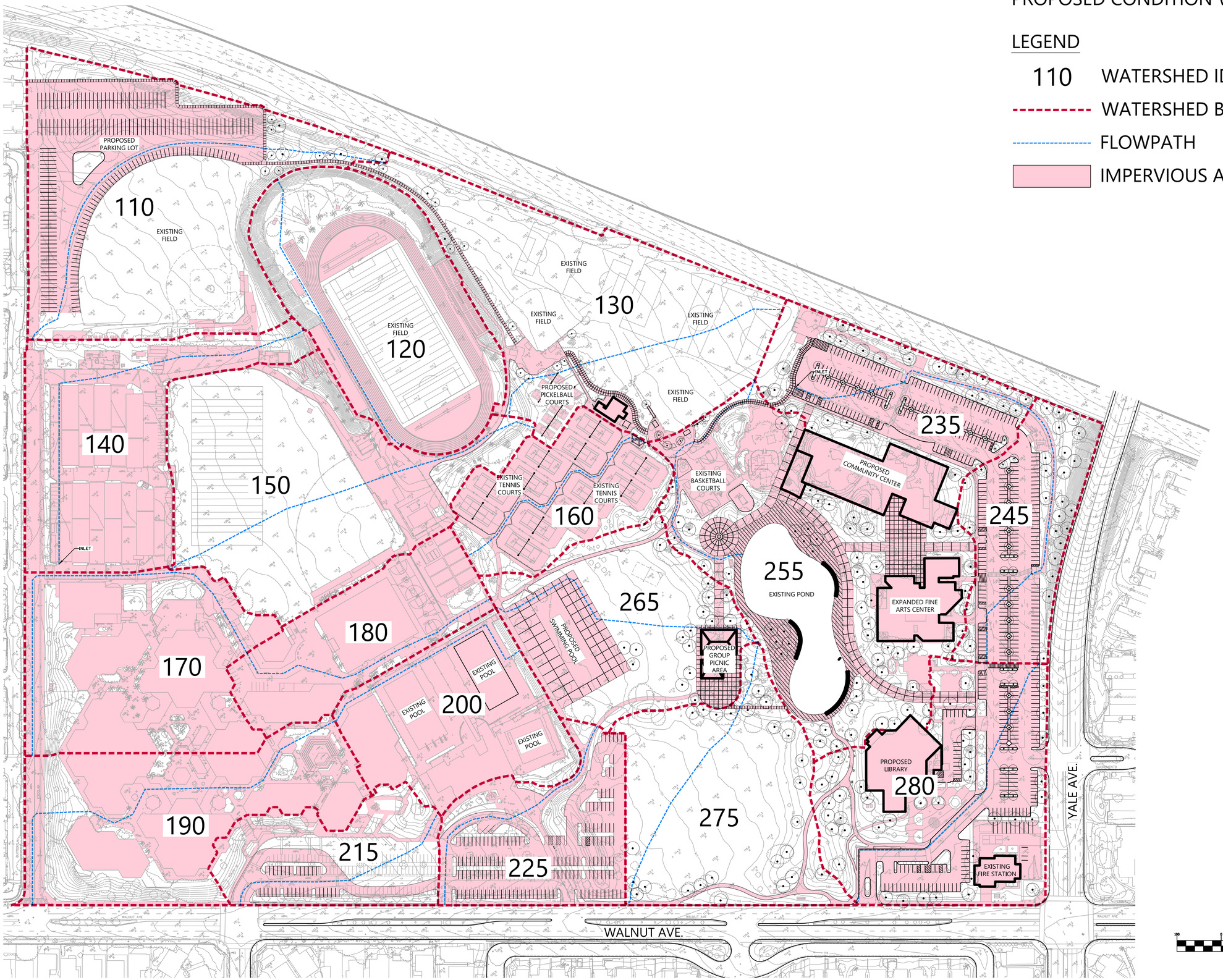
EXISTING CONDITION WATERSHED MAP

No.	Revisions

Date: 12/22/2022
Scale: AS SHOWN
Design: DESN
Drawn: DRWN
Approved: APRV
Job No: 20180780

Drawing Number:
01

PROPOSED CONDITION WATERSHED MAP



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02

6. APPENDICES

Appendix A. Existing & Proposed Hydrology Summary Tables

Appendix B. 25-Year AES Modeling Calculations

Appendix C. 100-Year AES Modeling Calculations

APPENDIX A.

Existing & Proposed Hydrology Summary Tables

Existing Condition Hydrology Summary Table

Area ID	Total Area (ac)	Impervious Area (ac)	Impervious Percentage	Length (ft)	U/S Elev (ft)	D/S Elev (ft)	Slope (%)	T_c (min)	Q_{25} (cfs)	Q_{100} (cfs)
110	7.82	0.41	5.3%	1,083	122	106	1.5%	11.0	20.40	26.39
120	5.36	2.02	37.7%	684	125	112	1.9%	9.1	15.93	20.52
130	6.70	0.53	7.8%	704	128	112	2.3%	8.9	19.84	25.66
140	4.58	3.77	82.5%	979	130	102	2.9%	9.7	13.50	17.27
150	6.58	1.23	18.7%	900	118	106	1.3%	11.0	17.36	22.41
160	2.65	2.21	83.1%	563	121	113	1.4%	9.0	8.22	10.52
170	4.74	3.83	80.8%	984	109	99	1.0%	12.0	12.38	15.83
180	2.87	2.70	94.1%	635	114	109	0.8%	10.6	8.10	10.35
190	4.82	3.58	74.3%	994	110	97	1.3%	11.4	12.90	16.51
200	3.46	3.02	87.3%	540	114	110	0.7%	10.0	10.07	12.88
210	2.52	1.84	73.0%	565	108	101	1.2%	9.2	7.58	9.72
220	2.23	1.48	66.5%	511	116	104	2.3%	7.8	7.36	9.45
230	3.90	2.37	60.7%	570	135	122	2.3%	8.2	12.52	16.09
240	2.85	1.72	60.3%	653	135	123	1.8%	9.0	8.65	11.10
250	7.75	2.67	34.5%	618	125	120	0.8%	10.4	21.32	27.46
260	4.16	0.32	7.7%	688	124	114	1.5%	9.7	11.77	15.22
270	5.48	0.25	4.6%	721	124	111	1.8%	9.4	15.66	20.26
280	5.44	3.56	65.4%	778	125	116	1.2%	10.6	15.10	19.36
∑	83.9	37.5	44.7%	----	----	----	----	----	239	307

Proposed Condition Hydrology Summary Table

Area ID	Total Area (ac)	Impervious Area (ac)	Impervious Percentage	Length (ft)	U/S Elev (ft)	D/S Elev (ft)	Slope (%)	T_c (min)	Q_{25} (cfs)	Q_{100} (cfs)
110	7.82	3.30	42.2%	1,083	122	106	1.5%	11.0	20.92	26.91
120	5.36	2.02	37.7%	684	125	112	1.9%	9.1	15.93	20.52
130	6.70	0.72	10.7%	704	128	112	2.3%	8.9	19.88	25.69
140	4.58	3.77	82.5%	979	130	102	2.9%	9.7	13.50	17.27
150	6.58	1.23	18.7%	900	118	106	1.3%	11.0	17.36	22.41
160	2.65	2.21	83.1%	563	121	113	1.4%	9.0	8.22	10.52
170	4.74	3.83	80.8%	984	109	99	1.0%	12.0	12.38	15.83
180	2.87	2.70	94.1%	635	114	109	0.8%	10.6	8.10	10.35
190	4.82	3.58	74.3%	994	110	97	1.3%	11.4	12.90	16.51
200	3.46	3.02	87.2%	540	114	110	0.7%	10.0	10.07	12.88
215	2.48	1.10	44.4%	545	108	101	1.3%	9.0	7.46	9.59
225	2.95	2.29	77.5%	616	116	106	1.6%	9.0	9.03	11.57
235	4.29	2.96	69.2%	570	135	122	2.3%	8.2	13.84	17.76
245	2.83	1.72	60.9%	653	135	123	1.8%	9.0	8.56	10.99
255	7.40	3.77	50.9%	619	125	120	0.8%	10.4	20.54	26.39
265	4.26	1.77	41.6%	683	124	114	1.5%	9.6	12.32	15.85
275	4.70	0.17	3.6%	677	124	111	1.9%	9.1	13.73	17.77
280	5.44	3.60	66.2%	778	125	116	1.2%	10.6	15.08	19.33
∑	83.9	43.8	52.2%	----	----	----	----	----	240	308

APPENDIX B.

25-Year AES Modeling Calculations

Existing Condition
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 1676

                        Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: IHPEX25.DAT
  TIME/DATE OF STUDY: 16:43 12/14/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.50
  *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    110.20 TO NODE    110.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =    122.00  DOWNSTREAM(FEET) =    106.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.017
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.085
  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        0.46      0.20     0.100    75   11.02
  NATURAL GOOD COVER
  "GRASS"                    D        7.37      0.20     1.000    80   33.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.947
  SUBAREA RUNOFF(CFS) =     20.40
  TOTAL AREA(ACRES) =      7.83   PEAK FLOW RATE(CFS) =     20.40

************************************************************************
  FLOW PROCESS FROM NODE    120.20 TO NODE    120.10 IS CODE =  21
```

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------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   684.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.144
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.428
  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        2.24      0.20     0.100    75    9.14
  NATURAL GOOD COVER
  "GRASS"                    D        3.12      0.20     1.000    80   28.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA RUNOFF(CFS) =     15.93
  TOTAL AREA(ACRES) =      5.36   PEAK FLOW RATE(CFS) =     15.93

************************************************************************
  FLOW PROCESS FROM NODE    130.20 TO NODE    130.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   704.00
  ELEVATION DATA: UPSTREAM(FEET) =    128.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.925
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.475
  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        0.59      0.20     0.100    75    8.92
  NATURAL GOOD COVER
  "GRASS"                    D        6.11      0.20     1.000    80   27.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.921
  SUBAREA RUNOFF(CFS) =     19.84
  TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     19.84

************************************************************************
  FLOW PROCESS FROM NODE    140.20 TO NODE    140.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  ELEVATION DATA: UPSTREAM(FEET) =    130.00  DOWNSTREAM(FEET) =    102.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.725
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.310
  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        4.19      0.20     0.100    75    9.73
  NATURAL GOOD COVER
  "GRASS"                    D        0.39      0.20     1.000    80   29.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.177
  SUBAREA RUNOFF(CFS) =     13.50
  TOTAL AREA(ACRES) =      4.58   PEAK FLOW RATE(CFS) =     13.50

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

```
 FLOW PROCESS FROM NODE    150.20 TO NODE    150.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
 ELEVATION DATA: UPSTREAM(FEET) =    118.00  DOWNSTREAM(FEET) =    106.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.954
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
 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        1.37      0.20     0.100    75   10.95
 NATURAL GOOD COVER
 "GRASS"                    D        5.21      0.20     1.000    80   33.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.813
 SUBAREA RUNOFF(CFS) =     17.36
 TOTAL AREA(ACRES) =      6.58   PEAK FLOW RATE(CFS) =     17.36

****************************************************************************
 FLOW PROCESS FROM NODE    160.20 TO NODE    160.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   563.00
 ELEVATION DATA: UPSTREAM(FEET) =    121.00  DOWNSTREAM(FEET) =    113.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.965
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.466
 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        2.46      0.20     0.100    75    8.97
 NATURAL GOOD COVER
 "GRASS"                    D        0.20      0.20     1.000    80   27.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.168
 SUBAREA RUNOFF(CFS) =      8.22
 TOTAL AREA(ACRES) =      2.66   PEAK FLOW RATE(CFS) =      8.22

****************************************************************************
 FLOW PROCESS FROM NODE    170.20 TO NODE    170.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   984.00
 ELEVATION DATA: UPSTREAM(FEET) =    109.00  DOWNSTREAM(FEET) =     99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.986
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.941
 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        4.26      0.20     0.100    75   11.99
 NATURAL GOOD COVER
 "GRASS"                    D        0.48      0.20     1.000    80   36.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.191
 SUBAREA RUNOFF(CFS) =     12.38
 TOTAL AREA(ACRES) =      4.74   PEAK FLOW RATE(CFS) =     12.38
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    180.20 TO NODE    180.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   635.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    109.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.586
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.155
  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        2.87      0.20     0.100    75   10.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      8.10
  TOTAL AREA(ACRES) =      2.87   PEAK FLOW RATE(CFS) =      8.10

****************************************************************************
  FLOW PROCESS FROM NODE    190.20 TO NODE    190.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   994.00
  ELEVATION DATA: UPSTREAM(FEET) =    110.00  DOWNSTREAM(FEET) =     97.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.442
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.019
  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        3.98      0.20     0.100    75   11.44
  NATURAL GOOD COVER
  "GRASS"                    D        0.85      0.20     1.000    80   35.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.258
  SUBAREA RUNOFF(CFS) =     12.90
  TOTAL AREA(ACRES) =      4.83   PEAK FLOW RATE(CFS) =     12.90

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    110.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.044
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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        3.36      0.20     0.100    75   10.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.11      0.20     1.000    80   30.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.129
  SUBAREA RUNOFF(CFS) =     10.07
  TOTAL AREA(ACRES) =      3.47   PEAK FLOW RATE(CFS) =     10.07

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

```
 FLOW PROCESS FROM NODE    210.20 TO NODE    210.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   565.00
 ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    101.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.227
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.410
 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        2.04      0.20     0.100    75    9.23
 NATURAL GOOD COVER
 "GRASS"                    D        0.47      0.20     1.000    80   28.38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.269
 SUBAREA RUNOFF(CFS) =      7.58
 TOTAL AREA(ACRES) =      2.51   PEAK FLOW RATE(CFS) =      7.58

****************************************************************************
 FLOW PROCESS FROM NODE    220.20 TO NODE    220.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   511.00
 ELEVATION DATA: UPSTREAM(FEET) =    116.00  DOWNSTREAM(FEET) =    104.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.800
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.750
 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        1.64      0.20     0.100    75    7.80
 NATURAL GOOD COVER
 "GRASS"                    D        0.58      0.20     1.000    80   23.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.335
 SUBAREA RUNOFF(CFS) =      7.36
 TOTAL AREA(ACRES) =      2.22   PEAK FLOW RATE(CFS) =      7.36

****************************************************************************
 FLOW PROCESS FROM NODE    230.20 TO NODE    230.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
 ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    122.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.196
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.647
 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        2.63      0.20     0.100    75    8.20
 NATURAL GOOD COVER
 "GRASS"                    D        1.27      0.20     1.000    80   25.21
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.393
 SUBAREA RUNOFF(CFS) =     12.52
 TOTAL AREA(ACRES) =      3.90   PEAK FLOW RATE(CFS) =     12.52
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    240.20 TO NODE    240.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   653.00
  ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    123.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.036
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.451
  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        1.91      0.20     0.100    75    9.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.94      0.20     1.000    80   27.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.397
  SUBAREA RUNOFF(CFS) =      8.65
  TOTAL AREA(ACRES) =      2.85   PEAK FLOW RATE(CFS) =      8.65

****************************************************************************
  FLOW PROCESS FROM NODE    250.20 TO NODE    250.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   618.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.415
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  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        2.97      0.20     0.100    75   10.42
  NATURAL GOOD COVER
  "GRASS"                    D        4.79      0.20     1.000    80   32.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.656
  SUBAREA RUNOFF(CFS) =     21.32
  TOTAL AREA(ACRES) =      7.76   PEAK FLOW RATE(CFS) =     21.32

****************************************************************************
  FLOW PROCESS FROM NODE    260.20 TO NODE    260.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   688.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    114.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.321
  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        0.36      0.20     0.100    75    9.67
  NATURAL GOOD COVER
  "GRASS"                    D        3.81      0.20     1.000    80   29.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.922
  SUBAREA RUNOFF(CFS) =     11.77
  TOTAL AREA(ACRES) =      4.17   PEAK FLOW RATE(CFS) =     11.77
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    270.20 TO NODE    270.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   721.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    111.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.437
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.367
  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        0.28      0.20     0.100    75    9.44
  NATURAL GOOD COVER
  "GRASS"                    D        5.20      0.20     1.000    80   29.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.954
  SUBAREA RUNOFF(CFS) =     15.66
  TOTAL AREA(ACRES) =      5.48   PEAK FLOW RATE(CFS) =     15.66

****************************************************************************
  FLOW PROCESS FROM NODE    280.20 TO NODE    280.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   778.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    116.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.147
  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        3.96      0.20     0.100    75   10.63
  NATURAL GOOD COVER
  "GRASS"                    D        1.49      0.20     1.000    80   32.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.346
  SUBAREA RUNOFF(CFS) =     15.10
  TOTAL AREA(ACRES) =      5.45   PEAK FLOW RATE(CFS) =     15.10
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.4  TC(MIN.) =     10.63
  EFFECTIVE AREA(ACRES) =      5.45  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.346
  PEAK FLOW RATE(CFS)   =      15.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Proposed Condition
25-Year

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1676

                        Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: IHPPR25.DAT
  TIME/DATE OF STUDY: 16:44 12/14/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.50
  *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    110.20 TO NODE    110.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =    122.00  DOWNSTREAM(FEET) =    106.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.017
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.085
  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        3.67      0.20     0.100    75   11.02
  NATURAL GOOD COVER
  "GRASS"                    D        4.16      0.20     1.000    80   33.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.578
  SUBAREA RUNOFF(CFS) =     20.92
  TOTAL AREA(ACRES) =      7.83   PEAK FLOW RATE(CFS) =     20.92

************************************************************************
  FLOW PROCESS FROM NODE    120.20 TO NODE    120.10 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   684.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.144
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.428
  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        2.24      0.20     0.100    75    9.14
  NATURAL GOOD COVER
  "GRASS"                    D        3.12      0.20     1.000    80   28.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA RUNOFF(CFS) =     15.93
  TOTAL AREA(ACRES) =      5.36   PEAK FLOW RATE(CFS) =     15.93

****************************************************************************
  FLOW PROCESS FROM NODE    130.20 TO NODE    130.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   704.00
  ELEVATION DATA: UPSTREAM(FEET) =    128.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.925
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.475
  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        0.80      0.20     0.100    75    8.92
  NATURAL GOOD COVER
  "GRASS"                    D        5.90      0.20     1.000    80   27.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.893
  SUBAREA RUNOFF(CFS) =     19.88
  TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     19.88

****************************************************************************
  FLOW PROCESS FROM NODE    140.20 TO NODE    140.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  ELEVATION DATA: UPSTREAM(FEET) =    130.00  DOWNSTREAM(FEET) =    102.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.725
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.310
  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        4.19      0.20     0.100    75    9.73
  NATURAL GOOD COVER
  "GRASS"                    D        0.39      0.20     1.000    80   29.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.177
  SUBAREA RUNOFF(CFS) =     13.50
  TOTAL AREA(ACRES) =      4.58   PEAK FLOW RATE(CFS) =     13.50

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

```
 FLOW PROCESS FROM NODE    150.20 TO NODE    150.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
 ELEVATION DATA: UPSTREAM(FEET) =    118.00  DOWNSTREAM(FEET) =    106.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.954
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
 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        1.37      0.20     0.100    75   10.95
 NATURAL GOOD COVER
 "GRASS"                    D        5.21      0.20     1.000    80   33.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.813
 SUBAREA RUNOFF(CFS) =     17.36
 TOTAL AREA(ACRES) =      6.58   PEAK FLOW RATE(CFS) =     17.36

****************************************************************************
 FLOW PROCESS FROM NODE    160.20 TO NODE    160.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   563.00
 ELEVATION DATA: UPSTREAM(FEET) =    121.00  DOWNSTREAM(FEET) =    113.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.965
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.466
 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        2.46      0.20     0.100    75    8.97
 NATURAL GOOD COVER
 "GRASS"                    D        0.20      0.20     1.000    80   27.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.168
 SUBAREA RUNOFF(CFS) =      8.22
 TOTAL AREA(ACRES) =      2.66   PEAK FLOW RATE(CFS) =      8.22

****************************************************************************
 FLOW PROCESS FROM NODE    170.20 TO NODE    170.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   984.00
 ELEVATION DATA: UPSTREAM(FEET) =    109.00  DOWNSTREAM(FEET) =     99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.986
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.941
 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        4.26      0.20     0.100    75   11.99
 NATURAL GOOD COVER
 "GRASS"                    D        0.48      0.20     1.000    80   36.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.191
 SUBAREA RUNOFF(CFS) =     12.38
 TOTAL AREA(ACRES) =      4.74   PEAK FLOW RATE(CFS) =     12.38
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    180.20 TO NODE    180.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   635.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    109.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.586
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.155
  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        2.87      0.20     0.100    75   10.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      8.10
  TOTAL AREA(ACRES) =      2.87   PEAK FLOW RATE(CFS) =      8.10

****************************************************************************
  FLOW PROCESS FROM NODE    190.20 TO NODE    190.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   994.00
  ELEVATION DATA: UPSTREAM(FEET) =    110.00  DOWNSTREAM(FEET) =     97.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.442
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.019
  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        3.98      0.20     0.100    75   11.44
  NATURAL GOOD COVER
  "GRASS"                    D        0.85      0.20     1.000    80   35.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.258
  SUBAREA RUNOFF(CFS) =     12.90
  TOTAL AREA(ACRES) =      4.83   PEAK FLOW RATE(CFS) =     12.90

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    110.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.044
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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        3.36      0.20     0.100    75   10.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.11      0.20     1.000    80   30.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.129
  SUBAREA RUNOFF(CFS) =     10.07
  TOTAL AREA(ACRES) =      3.47   PEAK FLOW RATE(CFS) =     10.07

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

```
 FLOW PROCESS FROM NODE    215.20 TO NODE    215.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   545.00
 ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    101.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.030
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.452
 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        1.22      0.20     0.100    75    9.03
 NATURAL GOOD COVER
 "GRASS"                    D        1.26      0.20     1.000    80   27.77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.557
 SUBAREA RUNOFF(CFS) =      7.46
 TOTAL AREA(ACRES) =      2.48   PEAK FLOW RATE(CFS) =      7.46

****************************************************************************
 FLOW PROCESS FROM NODE    225.20 TO NODE    225.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   616.00
 ELEVATION DATA: UPSTREAM(FEET) =    116.00  DOWNSTREAM(FEET) =    106.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.049
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.448
 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        2.54      0.20     0.100    75    9.05
 NATURAL GOOD COVER
 "GRASS"                    D        0.41      0.20     1.000    80   27.83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.225
 SUBAREA RUNOFF(CFS) =      9.03
 TOTAL AREA(ACRES) =      2.95   PEAK FLOW RATE(CFS) =      9.03

****************************************************************************
 FLOW PROCESS FROM NODE    235.20 TO NODE    235.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
 ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    122.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.196
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.647
 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        3.29      0.20     0.100    75    8.20
 NATURAL GOOD COVER
 "GRASS"                    D        1.00      0.20     1.000    80   25.21
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.310
 SUBAREA RUNOFF(CFS) =     13.84
 TOTAL AREA(ACRES) =      4.29   PEAK FLOW RATE(CFS) =     13.84
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    245.20 TO NODE    245.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   653.00
  ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    123.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.036
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.451
  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        1.91      0.20     0.100    75    9.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.91      0.20     1.000    80   27.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.390
  SUBAREA RUNOFF(CFS) =      8.56
  TOTAL AREA(ACRES) =      2.82   PEAK FLOW RATE(CFS) =      8.56

****************************************************************************
  FLOW PROCESS FROM NODE    255.20 TO NODE    255.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   619.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.425
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.182
  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        4.19      0.20     0.100    75   10.43
  NATURAL GOOD COVER
  "GRASS"                    D        3.21      0.20     1.000    80   32.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.490
  SUBAREA RUNOFF(CFS) =     20.54
  TOTAL AREA(ACRES) =      7.40   PEAK FLOW RATE(CFS) =     20.54

****************************************************************************
  FLOW PROCESS FROM NODE    265.20 TO NODE    265.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   683.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    114.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.628
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.329
  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        1.97      0.20     0.100    75    9.63
  NATURAL GOOD COVER
  "GRASS"                    D        2.29      0.20     1.000    80   29.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.584
  SUBAREA RUNOFF(CFS) =     12.32
  TOTAL AREA(ACRES) =      4.26   PEAK FLOW RATE(CFS) =     12.32
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    275.20 TO NODE    275.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   677.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    111.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.087
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  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        0.19      0.20     0.100    75    9.09
  NATURAL GOOD COVER
  "GRASS"                    D        4.51      0.20     1.000    80   27.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.964
  SUBAREA RUNOFF(CFS) =     13.73
  TOTAL AREA(ACRES) =      4.70   PEAK FLOW RATE(CFS) =     13.73

****************************************************************************
  FLOW PROCESS FROM NODE    280.20 TO NODE    280.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   778.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    116.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.147
  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        4.00      0.20     0.100    75   10.63
  NATURAL GOOD COVER
  "GRASS"                    D        1.44      0.20     1.000    80   32.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.338
  SUBAREA RUNOFF(CFS) =     15.08
  TOTAL AREA(ACRES) =      5.44   PEAK FLOW RATE(CFS) =     15.08
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.4  TC(MIN.) =     10.63
  EFFECTIVE AREA(ACRES) =      5.44  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.338
  PEAK FLOW RATE(CFS)   =      15.08
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

100-Year AES Modeling Calculations

Existing Condition
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 1676

                        Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: IHPEX100.DAT
  TIME/DATE OF STUDY: 16:47 12/14/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.50
  *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    110.20 TO NODE    110.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =    122.00  DOWNSTREAM(FEET) =    106.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.017
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.935
  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        0.46      0.20     0.100    91   11.02
  NATURAL GOOD COVER
  "GRASS"                    D        7.37      0.20     1.000    94   33.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.947
  SUBAREA RUNOFF(CFS) =     26.39
  TOTAL AREA(ACRES) =      7.83   PEAK FLOW RATE(CFS) =     26.39

************************************************************************
  FLOW PROCESS FROM NODE    120.20 TO NODE    120.10 IS CODE =  21
```

```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   684.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.144
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.378
  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        2.24      0.20     0.100    91    9.14
  NATURAL GOOD COVER
  "GRASS"                    D        3.12      0.20     1.000    94   28.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA RUNOFF(CFS) =     20.52
  TOTAL AREA(ACRES) =      5.36   PEAK FLOW RATE(CFS) =     20.52

************************************************************************
  FLOW PROCESS FROM NODE    130.20 TO NODE    130.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   704.00
  ELEVATION DATA: UPSTREAM(FEET) =    128.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.925
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.439
  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        0.59      0.20     0.100    91    8.92
  NATURAL GOOD COVER
  "GRASS"                    D        6.11      0.20     1.000    94   27.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.921
  SUBAREA RUNOFF(CFS) =     25.66
  TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     25.66

************************************************************************
  FLOW PROCESS FROM NODE    140.20 TO NODE    140.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  ELEVATION DATA: UPSTREAM(FEET) =    130.00  DOWNSTREAM(FEET) =    102.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.725
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.226
  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        4.19      0.20     0.100    91    9.73
  NATURAL GOOD COVER
  "GRASS"                    D        0.39      0.20     1.000    94   29.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.177
  SUBAREA RUNOFF(CFS) =     17.27
  TOTAL AREA(ACRES) =      4.58   PEAK FLOW RATE(CFS) =     17.27

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

```
 FLOW PROCESS FROM NODE    150.20 TO NODE    150.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
 ELEVATION DATA: UPSTREAM(FEET) =    118.00  DOWNSTREAM(FEET) =    106.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.954
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.948
 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        1.37      0.20     0.100    91   10.95
 NATURAL GOOD COVER
 "GRASS"                    D        5.21      0.20     1.000    94   33.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.813
 SUBAREA RUNOFF(CFS) =     22.41
 TOTAL AREA(ACRES) =      6.58   PEAK FLOW RATE(CFS) =     22.41

****************************************************************************
 FLOW PROCESS FROM NODE    160.20 TO NODE    160.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   563.00
 ELEVATION DATA: UPSTREAM(FEET) =    121.00  DOWNSTREAM(FEET) =    113.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.965
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.428
 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        2.46      0.20     0.100    91    8.97
 NATURAL GOOD COVER
 "GRASS"                    D        0.20      0.20     1.000    94   27.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.168
 SUBAREA RUNOFF(CFS) =     10.52
 TOTAL AREA(ACRES) =      2.66   PEAK FLOW RATE(CFS) =     10.52

****************************************************************************
 FLOW PROCESS FROM NODE    170.20 TO NODE    170.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   984.00
 ELEVATION DATA: UPSTREAM(FEET) =    109.00  DOWNSTREAM(FEET) =     99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.986
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.749
 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        4.26      0.20     0.100    91   11.99
 NATURAL GOOD COVER
 "GRASS"                    D        0.48      0.20     1.000    94   36.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.191
 SUBAREA RUNOFF(CFS) =     15.83
 TOTAL AREA(ACRES) =      4.74   PEAK FLOW RATE(CFS) =     15.83
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    180.20 TO NODE    180.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   635.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    109.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.586
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.026
  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        2.87      0.20     0.100    91   10.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     10.35
  TOTAL AREA(ACRES) =      2.87   PEAK FLOW RATE(CFS) =     10.35

****************************************************************************
  FLOW PROCESS FROM NODE    190.20 TO NODE    190.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   994.00
  ELEVATION DATA: UPSTREAM(FEET) =    110.00  DOWNSTREAM(FEET) =     97.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.442
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.850
  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        3.98      0.20     0.100    91   11.44
  NATURAL GOOD COVER
  "GRASS"                    D        0.85      0.20     1.000    94   35.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.258
  SUBAREA RUNOFF(CFS) =     16.51
  TOTAL AREA(ACRES) =      4.83   PEAK FLOW RATE(CFS) =     16.51

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    110.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.044
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.149
  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        3.36      0.20     0.100    91   10.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.11      0.20     1.000    94   30.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.129
  SUBAREA RUNOFF(CFS) =     12.88
  TOTAL AREA(ACRES) =      3.47   PEAK FLOW RATE(CFS) =     12.88

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

```
 FLOW PROCESS FROM NODE    210.20 TO NODE    210.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   565.00
 ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    101.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.227
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.355
 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        2.04      0.20     0.100    91    9.23
 NATURAL GOOD COVER
 "GRASS"                    D        0.47      0.20     1.000    94   28.38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.269
 SUBAREA RUNOFF(CFS) =      9.72
 TOTAL AREA(ACRES) =      2.51   PEAK FLOW RATE(CFS) =      9.72

****************************************************************************
 FLOW PROCESS FROM NODE    220.20 TO NODE    220.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   511.00
 ELEVATION DATA: UPSTREAM(FEET) =    116.00  DOWNSTREAM(FEET) =    104.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.800
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.796
 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        1.64      0.20     0.100    91    7.80
 NATURAL GOOD COVER
 "GRASS"                    D        0.58      0.20     1.000    94   23.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.335
 SUBAREA RUNOFF(CFS) =      9.45
 TOTAL AREA(ACRES) =      2.22   PEAK FLOW RATE(CFS) =      9.45

****************************************************************************
 FLOW PROCESS FROM NODE    230.20 TO NODE    230.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
 ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    122.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.196
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.661
 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        2.63      0.20     0.100    91    8.20
 NATURAL GOOD COVER
 "GRASS"                    D        1.27      0.20     1.000    94   25.21
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.393
 SUBAREA RUNOFF(CFS) =     16.09
 TOTAL AREA(ACRES) =      3.90   PEAK FLOW RATE(CFS) =     16.09
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    240.20 TO NODE    240.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   653.00
  ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    123.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.036
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.408
  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        1.91      0.20     0.100    91    9.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.94      0.20     1.000    94   27.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.397
  SUBAREA RUNOFF(CFS) =     11.10
  TOTAL AREA(ACRES) =      2.85   PEAK FLOW RATE(CFS) =     11.10

****************************************************************************
  FLOW PROCESS FROM NODE    250.20 TO NODE    250.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   618.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.415
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.063
  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        2.97      0.20     0.100    91   10.42
  NATURAL GOOD COVER
  "GRASS"                    D        4.79      0.20     1.000    94   32.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.656
  SUBAREA RUNOFF(CFS) =     27.46
  TOTAL AREA(ACRES) =      7.76   PEAK FLOW RATE(CFS) =     27.46

****************************************************************************
  FLOW PROCESS FROM NODE    260.20 TO NODE    260.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   688.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    114.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.240
  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        0.36      0.20     0.100    91    9.67
  NATURAL GOOD COVER
  "GRASS"                    D        3.81      0.20     1.000    94   29.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.922
  SUBAREA RUNOFF(CFS) =     15.22
  TOTAL AREA(ACRES) =      4.17   PEAK FLOW RATE(CFS) =     15.22
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    270.20 TO NODE    270.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   721.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    111.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.437
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.300
  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        0.28      0.20     0.100    91    9.44
  NATURAL GOOD COVER
  "GRASS"                    D        5.20      0.20     1.000    94   29.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.954
  SUBAREA RUNOFF(CFS) =     20.26
  TOTAL AREA(ACRES) =      5.48   PEAK FLOW RATE(CFS) =     20.26

****************************************************************************
  FLOW PROCESS FROM NODE    280.20 TO NODE    280.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   778.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    116.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.016
  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        3.96      0.20     0.100    91   10.63
  NATURAL GOOD COVER
  "GRASS"                    D        1.49      0.20     1.000    94   32.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.346
  SUBAREA RUNOFF(CFS) =     19.36
  TOTAL AREA(ACRES) =      5.45   PEAK FLOW RATE(CFS) =     19.36
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.4  TC(MIN.) =     10.63
  EFFECTIVE AREA(ACRES) =      5.45  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.346
  PEAK FLOW RATE(CFS)   =      19.36
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Proposed Condition
100-Year

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




------------------------------------------------------------------------
  FILE NAME: IHPPR100.DAT
  TIME/DATE OF STUDY: 16:48 12/14/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.50
  *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    110.20 TO NODE    110.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =    122.00  DOWNSTREAM(FEET) =    106.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.017
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.935
  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        3.67      0.20     0.100    91   11.02
  NATURAL GOOD COVER
  "GRASS"                    D        4.16      0.20     1.000    94   33.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.578
  SUBAREA RUNOFF(CFS) =     26.91
  TOTAL AREA(ACRES) =      7.83   PEAK FLOW RATE(CFS) =     26.91

************************************************************************
  FLOW PROCESS FROM NODE    120.20 TO NODE    120.10 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   684.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.144
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.378
  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        2.24      0.20     0.100    91    9.14
  NATURAL GOOD COVER
  "GRASS"                    D        3.12      0.20     1.000    94   28.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.624
  SUBAREA RUNOFF(CFS) =     20.52
  TOTAL AREA(ACRES) =      5.36   PEAK FLOW RATE(CFS) =     20.52

****************************************************************************
  FLOW PROCESS FROM NODE    130.20 TO NODE    130.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   704.00
  ELEVATION DATA: UPSTREAM(FEET) =    128.00  DOWNSTREAM(FEET) =    112.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.925
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.439
  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        0.80      0.20     0.100    91    8.92
  NATURAL GOOD COVER
  "GRASS"                    D        5.90      0.20     1.000    94   27.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.893
  SUBAREA RUNOFF(CFS) =     25.69
  TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     25.69

****************************************************************************
  FLOW PROCESS FROM NODE    140.20 TO NODE    140.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  ELEVATION DATA: UPSTREAM(FEET) =    130.00  DOWNSTREAM(FEET) =    102.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.725
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.226
  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        4.19      0.20     0.100    91    9.73
  NATURAL GOOD COVER
  "GRASS"                    D        0.39      0.20     1.000    94   29.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.177
  SUBAREA RUNOFF(CFS) =     17.27
  TOTAL AREA(ACRES) =      4.58   PEAK FLOW RATE(CFS) =     17.27

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

```
 FLOW PROCESS FROM NODE    150.20 TO NODE    150.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
 ELEVATION DATA: UPSTREAM(FEET) =    118.00  DOWNSTREAM(FEET) =    106.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.954
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.948
 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        1.37      0.20     0.100    91   10.95
 NATURAL GOOD COVER
 "GRASS"                    D        5.21      0.20     1.000    94   33.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.813
 SUBAREA RUNOFF(CFS) =     22.41
 TOTAL AREA(ACRES) =      6.58   PEAK FLOW RATE(CFS) =     22.41

****************************************************************************
 FLOW PROCESS FROM NODE    160.20 TO NODE    160.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   563.00
 ELEVATION DATA: UPSTREAM(FEET) =    121.00  DOWNSTREAM(FEET) =    113.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.965
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.428
 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        2.46      0.20     0.100    91    8.97
 NATURAL GOOD COVER
 "GRASS"                    D        0.20      0.20     1.000    94   27.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.168
 SUBAREA RUNOFF(CFS) =     10.52
 TOTAL AREA(ACRES) =      2.66   PEAK FLOW RATE(CFS) =     10.52

****************************************************************************
 FLOW PROCESS FROM NODE    170.20 TO NODE    170.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   984.00
 ELEVATION DATA: UPSTREAM(FEET) =    109.00  DOWNSTREAM(FEET) =     99.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.986
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.749
 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        4.26      0.20     0.100    91   11.99
 NATURAL GOOD COVER
 "GRASS"                    D        0.48      0.20     1.000    94   36.86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.191
 SUBAREA RUNOFF(CFS) =     15.83
 TOTAL AREA(ACRES) =      4.74   PEAK FLOW RATE(CFS) =     15.83
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    180.20 TO NODE    180.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   635.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    109.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.586
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.026
  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        2.87      0.20     0.100    91   10.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     10.35
  TOTAL AREA(ACRES) =      2.87   PEAK FLOW RATE(CFS) =     10.35

****************************************************************************
  FLOW PROCESS FROM NODE    190.20 TO NODE    190.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   994.00
  ELEVATION DATA: UPSTREAM(FEET) =    110.00  DOWNSTREAM(FEET) =     97.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.442
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.850
  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        3.98      0.20     0.100    91   11.44
  NATURAL GOOD COVER
  "GRASS"                    D        0.85      0.20     1.000    94   35.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.258
  SUBAREA RUNOFF(CFS) =     16.51
  TOTAL AREA(ACRES) =      4.83   PEAK FLOW RATE(CFS) =     16.51

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.00  DOWNSTREAM(FEET) =    110.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.044
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.149
  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        3.36      0.20     0.100    91   10.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.11      0.20     1.000    94   30.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.129
  SUBAREA RUNOFF(CFS) =     12.88
  TOTAL AREA(ACRES) =      3.47   PEAK FLOW RATE(CFS) =     12.88

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

```
 FLOW PROCESS FROM NODE    215.20 TO NODE    215.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   545.00
 ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    101.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.030
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.410
 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        1.22      0.20     0.100    91    9.03
 NATURAL GOOD COVER
 "GRASS"                    D        1.26      0.20     1.000    94   27.77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.557
 SUBAREA RUNOFF(CFS) =      9.59
 TOTAL AREA(ACRES) =      2.48   PEAK FLOW RATE(CFS) =      9.59

****************************************************************************
 FLOW PROCESS FROM NODE    225.20 TO NODE    225.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   616.00
 ELEVATION DATA: UPSTREAM(FEET) =    116.00  DOWNSTREAM(FEET) =    106.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.049
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.404
 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        2.54      0.20     0.100    91    9.05
 NATURAL GOOD COVER
 "GRASS"                    D        0.41      0.20     1.000    94   27.83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.225
 SUBAREA RUNOFF(CFS) =     11.57
 TOTAL AREA(ACRES) =      2.95   PEAK FLOW RATE(CFS) =     11.57

****************************************************************************
 FLOW PROCESS FROM NODE    235.20 TO NODE    235.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
 ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    122.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.196
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.661
 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        3.29      0.20     0.100    91    8.20
 NATURAL GOOD COVER
 "GRASS"                    D        1.00      0.20     1.000    94   25.21
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.310
 SUBAREA RUNOFF(CFS) =     17.76
 TOTAL AREA(ACRES) =      4.29   PEAK FLOW RATE(CFS) =     17.76
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    245.20 TO NODE    245.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   653.00
  ELEVATION DATA: UPSTREAM(FEET) =    135.00  DOWNSTREAM(FEET) =    123.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.036
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.408
  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        1.91      0.20     0.100    91    9.04
  NATURAL GOOD COVER
  "GRASS"                    D        0.91      0.20     1.000    94   27.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.390
  SUBAREA RUNOFF(CFS) =     10.99
  TOTAL AREA(ACRES) =      2.82   PEAK FLOW RATE(CFS) =     10.99

****************************************************************************
  FLOW PROCESS FROM NODE    255.20 TO NODE    255.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   619.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    120.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.425
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
  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        4.19      0.20     0.100    91   10.43
  NATURAL GOOD COVER
  "GRASS"                    D        3.21      0.20     1.000    94   32.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.490
  SUBAREA RUNOFF(CFS) =     26.39
  TOTAL AREA(ACRES) =      7.40   PEAK FLOW RATE(CFS) =     26.39

****************************************************************************
  FLOW PROCESS FROM NODE    265.20 TO NODE    265.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   683.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    114.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.628
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.251
  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        1.97      0.20     0.100    91    9.63
  NATURAL GOOD COVER
  "GRASS"                    D        2.29      0.20     1.000    94   29.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.584
  SUBAREA RUNOFF(CFS) =     15.85
  TOTAL AREA(ACRES) =      4.26   PEAK FLOW RATE(CFS) =     15.85
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    275.20 TO NODE    275.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   677.00
  ELEVATION DATA: UPSTREAM(FEET) =    124.00  DOWNSTREAM(FEET) =    111.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.087
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.394
  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        0.19      0.20     0.100    91    9.09
  NATURAL GOOD COVER
  "GRASS"                    D        4.51      0.20     1.000    94   27.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.964
  SUBAREA RUNOFF(CFS) =     17.77
  TOTAL AREA(ACRES) =      4.70   PEAK FLOW RATE(CFS) =     17.77

****************************************************************************
  FLOW PROCESS FROM NODE    280.20 TO NODE    280.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   778.00
  ELEVATION DATA: UPSTREAM(FEET) =    125.00  DOWNSTREAM(FEET) =    116.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.016
  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        4.00      0.20     0.100    91   10.63
  NATURAL GOOD COVER
  "GRASS"                    D        1.44      0.20     1.000    94   32.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.338
  SUBAREA RUNOFF(CFS) =     19.33
  TOTAL AREA(ACRES) =      5.44   PEAK FLOW RATE(CFS) =     19.33
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.4  TC(MIN.) =     10.63
  EFFECTIVE AREA(ACRES) =      5.44  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.338
  PEAK FLOW RATE(CFS)   =      19.33
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```