HYDROLOGY STUDY

For
TENTATIVE TRACT No. 15594
City of Lake Forest
County of Orange

Prepared For:

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W.O.#: 0245-9X HydStudy-TTM15594

HYDROLOGY STUDY

For

TENTATIVE TRACT 15594

City of Lake Forest
County of Orange

PREPARED UNDER THE SUPERVISION OF:

Jianhua "Gary" Guan, R.C.E. 64519, Exp. 06/30/13 Date:

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SECTION 1

INTRODUCTION

A. PROJECT LOCATION

The project is located in the City of Lake Forest, County of Orange County. The proposed site is at the intersection of Tamarisk and Peachwood. (See attached vicinity map).

B. STUDY PURPOSE

The purpose of this study is to provide flow rates produced from existing and proposed site. It also serves as the basis for analyzing and designing proposed and required storm drain system. The study also demonstrates the mitigation measures to reduce the increased flows below the existing levels due to the project development. Water quality measures will be implemented via Modular Wetland System.

C. METHODOLOGY

The rational method was used to calculate the design discharge for the local drainage areas since the watershed area to the proposed storm drain systems is less than one square mile.

Hydrologic calculations to determine the 10-year, 25-year and 100-year discharges at critical locations throughout the project site were performed using the Orange County Rational Method. A technical description of the rational method is provided in the Orange County Hydrology Manual dated October, 1986. The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for small watersheds for storms of a specified recurrence interval. The rational method equation is based on the assumption that the peak flow rate is directly proportional to the drainage area, rainfall intensity and a loss coefficient which describes the effects of land use and soil type. The design discharges were computed by generating a hydrologic "link-node" model which divides the area into subareas, each tributary to a concentration point or hydrologic "node" point determined by the proposed terrain or street layout.

The following assumptions/guidelines were applied for use of the Rational Method.

1. The rational Method Hydrology includes the effects of infiltration caused by soil surface characteristics. The soil map from Orange County Hydrology Manual indicates that the study area consists of soil types B, C and D. Hydrologic soils ratings are based on a scale

of A through D, where A is the most pervious, providing the least runoff.

2. The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surface. The runoff coefficients used for this study were based on the proposed land uses.
3. Standard intensity-duration curve data was taken from the Orange County Hydrology Manual, dated October, 1986.

The hydrologic calculations were prepared using the Advanced Engineering Software (A.E.S.) Rational Method computer program. The results of the hydrologic calculations were used to design the required storm drain facilities.

The unit hydrograph and basin routing analysis were prepared using the Advanced Engineering Software (A.E.S.) small area unit hydrograph and routing models.

D. DISCUSSION

There are two drainage systems within the studied area. Drainage Area "A" drains to the existing 30" RCP per improvement plans for Tract 12603. Drainage Area "B" drains to the existing 18" RCP per improvement plans for Tract 10931 and streets. The as-built storm drain plans can be found in Reference Section 5.

Existing Condition

In the existing condition Drainage Area "A" contains an approximate area of 23.6 acres of offsite and onsite and Drainage Area"B" contains 3 subareas with a combination area of 10.8 acres. The existing condition hydrology analysis can be found in Section 2 and the summary of the hydrology results can be found in Table 1.

Proposed Condition

In the proposed condition Drainage Area "A" contains an approximate area of 21.5 acres of offsite and onsite and Drainage Area "B" contains an approximate area of 12.3 acres. The hydrology summary with the comparison with existing conditions is illustrated in Table 1.

Table 1 Hydrology Summary for TTM 15594 in City of Lake Forest

Drainage Area	Proposed Condition							Existing Condition				Difference (proposed-existing)						
	Area	100-year flow		25-year flow		10-year flow		Area	100-yr flow	25-yr flow	10-yr flow	Area	100-year flow		25-year flow		10-year flow	
	(acre)	Without Mitigation (cfs)	**With Mitigation (cfs)**	Without Mitigation (cfs)	**With Mitigation (cfs)**	Without Mitigation (cfs)	**With Mitigation (cfs)**	(acre)	(cfs)	(cfs)	(cfs)	(acre)	Without Mitigation (cfs)	**With Mitigation (cfs)**	Without Mitigation (cfs)	**With Mitigation (cfs)**	Without Mitigation (cfs)	**With Mitigation (cfs)**
A	21.5	59.0	**59.0**	45.2	**45.2**	37.0	**37.0**	23.6	60.6	46.2	37.4	-2.1	-1.6	**-1.6**	-1.0	**-1.0**	-0.4	**-0.4**
B	12.3	37.6	**30.1**	29.1	**20.9**	24.1	**17.1**	10.8	30.3	23.4	19.2	1.6	7.3	**-0.2**	5.7	**-2.5**	4.9	**-2.1**
Total	33.8	96.6	**89.1**	74.3	**66.1**	61.1	**54.1**	34.35	90.9	69.6	56.6	-0.6	5.7	**-1.8**	4.7	**-3.5**	4.5	**-2.5**

Note: No mitigation is provided for Drainage Area "A"

Unit Hydrograph and Basin Routing Analysis

As shown from Table 1, the flow rates for proposed condition Drainage Area "A" are less than the existing ones and the flow rates for proposed condition Drainage Area "B" are more than the existing ones. The overall flow increase is 4.5 cfs for 10-year storm, 4.7 cfs for 25-year storm and 5.7 cfs for 100-year storm.

The proposed storm drain pipes between hydrology nodes 7 and 8 are upsized to act as the underground detention systems to mitigate the flow increases due to the project development. The preliminary basin routing analysis is performed to ensure the proposed upsized pipe can mitigate the flow increases. The pipe length is approximately 330 ft between node 7 and 8 and the pipe size is upsized to 72" pipe. There is a 12" orifice pipe at the downstream of 72" pipe to act as flow outlet pipe.

The stage-storage-outflow summary table can be found from Table 2 and detailed calculations can be found in Section 4.

Table 2 Stage-Storage-Outflow Summary for 72" pipe

72" RCP depth	AREA	Volume	Volume	Discharge	Note
	(ft^2)	(ft^3)	(ac-ft)	(cfs)	
0	0	0		0	
0.5	1	330	0.0076	0.56	from normal depth calculations
1	3	990	0.0227	2.67	from orifice flow calculations
2	7	2310	0.0530	4.63	
3	12	3960	0.0909	5.98	
4	17	5610	0.1288	7.07	
5	19.6	6468	0.1485	8.02	
6	19.6	4294	0.0986	8.87	
7	19.6	4296	0.0986	9.64	
8	19.6	4296	0.0986	10.35	
9	19.6	4296	0.0986	11.02	
10	19.6	4296	0.0986	11.65	
10.5	19.6	4296	0.0986	25.27	orifice flow + street flow

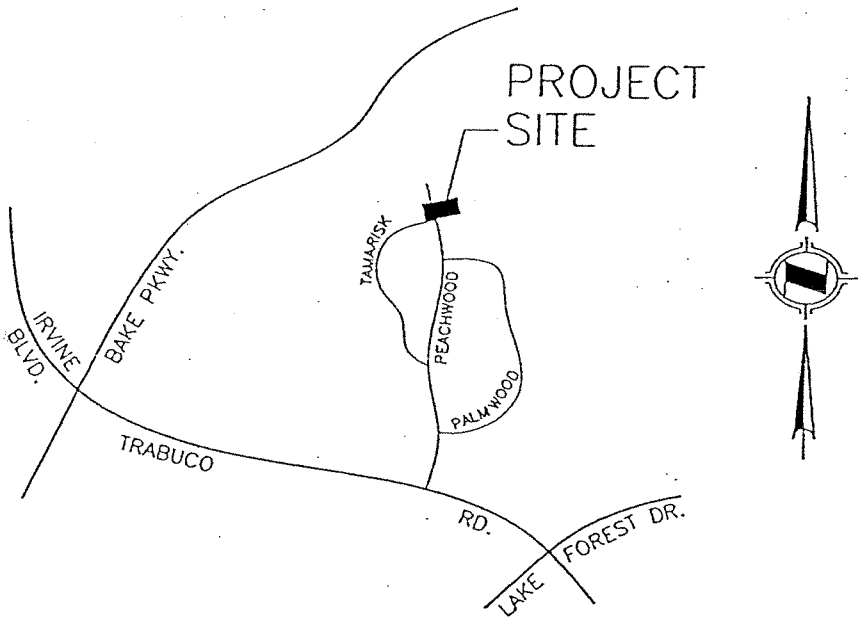
Note: the pipe length used is 330 ft

The basin routing summaries are illustrated in Table 3. As shown from Table 3, the proposed upsized pipe can reduce the flow increases due to the project development. Please note these are all for the preliminary analysis, the pipe sizes and stage-storage-outflow information may vary during the final design phase when detailed information is available.

Table 3 Basin Routing Summary for TTM 15594 in City of Lake Forest

Storm	Inflow	outflow	flow reduction	overall flow increase per Table 1	flow reduction more than flow increase
	(cfs)	(cfs)	(cfs)	(cfs)	
10-year	13.8	6.8	7	4.5	yes
25-year	16.7	8.5	8.2	4.7	yes
100-year	21.6	14.1	7.5	5.7	yes

E. VICINITY MAP



VICINITY MAP

NO SCALE

SECTION 2

EXISTING CONDITION
HYDROLOGY CALCULATIONS AND MAP

A. 10-YEAR STORM

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 ************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 13.1  Release Date: 06/15/2006  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************ DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                   *
* Existing Condition, Drainage Area "A"                                *
* 10-year Storm                                                        *
 ************************************************************************

  FILE NAME: E3.DAT
  TIME/DATE OF STUDY: 08:16 07/21/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   14.0       9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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     30.00 TO NODE     31.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    640.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.853
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.363
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D       1.00      0.20      1.000    81   12.85
  NATURAL GOOD COVER
  "OPEN BRUSH"                B       0.23      0.30      1.000    63   12.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      2.37

************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1122.00   CHANNEL SLOPE =  0.0588
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.37
  FLOW VELOCITY(FEET/SEC) =   4.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.32   Tc(MIN.) =  17.17
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1422.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN) =  17.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.002
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D      10.80      0.20      1.000    81
  NATURAL GOOD COVER
  "OPEN BRUSH"                C       3.10      0.25      1.000    75
  NATURAL GOOD COVER
  "OPEN BRUSH"                B       8.50      0.30      1.000    63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.40      SUBAREA RUNOFF(CFS) =   35.42
  EFFECTIVE AREA(ACRES) =    23.63   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.6       PEAK FLOW RATE(CFS) =      37.39
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       23.6  TC(MIN.) =     17.17
  EFFECTIVE AREA(ACRES) =     23.63  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
```

```
  PEAK FLOW RATE(CFS)    =      37.39
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************ DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                   *
* Existing Condition, Drainage Area "B"                                *
* 10-year Storm                                                        *
 **************************************************************************

  FILE NAME: E2.DAT
  TIME/DATE OF STUDY: 08:15 07/21/2011
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ====== =====  =======
  1   14.0      9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =    587.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.172
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.149
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               D       1.26      0.20      1.000    81   15.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.21
  TOTAL AREA(ACRES) =      1.26   PEAK FLOW RATE(CFS) =      2.21

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    587.00  DOWNSTREAM(FEET) =    579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0348
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.21
  FLOW VELOCITY(FEET/SEC) =   3.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =  16.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  16.34
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D       1.09      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.09      SUBAREA RUNOFF(CFS) =    1.82
  EFFECTIVE AREA(ACRES) =      2.35   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       3.93
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        2.3  TC(MIN.) =     16.34
  EFFECTIVE AREA(ACRES) =      2.35  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       3.93
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for Serrano Highlands, Tract 15594                  *
* Existing Condition, Drainage Area "B"                               *
* 10-year Storm                                                       *
 **********************************************************************

  FILE NAME: E1.DAT
  TIME/DATE OF STUDY: 08:14 07/21/2011
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)   (FT)   (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.745
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.375
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.71      0.20      1.000    81   12.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.39
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      1.39

**************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  610.00  DOWNSTREAM ELEVATION(FEET) =  582.00
  STREET LENGTH(FEET) =   489.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.60

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.60
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   2.17   Tc(MIN.) =  14.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.170
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.07      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    1.90
  EFFECTIVE AREA(ACRES) =      1.78    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       3.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.74
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     755.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =         1.8  TC(MIN.) =     14.91
 EFFECTIVE AREA(ACRES) =       1.78  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       3.16
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
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                        Analysis prepared by:

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                              Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Serrano Highlands Hydrology Analysis                                  *
* Existing Condition, Drainage Area "B"                                 *
* 10-year Storm                                                         *
 ************************************************************************

  FILE NAME: SERRANOE.DAT
  TIME/DATE OF STUDY: 09:58 07/22/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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     20.00 TO NODE     21.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.837
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.606
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        0.32      0.25      1.000    75   10.84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      0.68

************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    572.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   879.00   CHANNEL SLOPE =  0.0887
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.68
  FLOW VELOCITY(FEET/SEC) =   4.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.28   Tc(MIN.) =  14.12
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1082.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN) =  14.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        6.00      0.20      1.000    81
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        0.28      0.25      1.000    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     6.28      SUBAREA RUNOFF(CFS) =    11.52
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      12.09
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        6.6  TC(MIN.) =     14.12
  EFFECTIVE AREA(ACRES) =      6.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      12.09
========================================================================
========================================================================
```

END OF RATIONAL METHOD ANALYSIS

B. 25-YEAR STORM

```
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                      Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for Serrano Highlands, Tract 15594                  *
* Existing Condition, Drainage Area "A"                               *
* 25-year Storm                                                       *
 **********************************************************************

  FILE NAME: E3.DAT
  TIME/DATE OF STUDY: 07:55 06/16/2011
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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     30.00 TO NODE     31.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    640.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.853
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.827
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        1.00      0.20      1.000    81   12.85
  NATURAL GOOD COVER
  "OPEN BRUSH"              B        0.23      0.30      1.000    63   12.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.89
  TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      2.89

**************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1122.00   CHANNEL SLOPE =  0.0588
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.89
  FLOW VELOCITY(FEET/SEC) =   4.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =  16.99
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1422.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  16.99
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.414
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"              D       10.80      0.20      1.000    81
  NATURAL GOOD COVER
  "OPEN BRUSH"              C        3.10      0.25      1.000    75
  NATURAL GOOD COVER
  "OPEN BRUSH"              B        8.50      0.30      1.000    63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.40      SUBAREA RUNOFF(CFS) =   43.72
  EFFECTIVE AREA(ACRES) =    23.63   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      23.6       PEAK FLOW RATE(CFS) =      46.15
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       23.6  TC(MIN.) =     16.99
  EFFECTIVE AREA(ACRES) =     23.63  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
```

```
  PEAK FLOW RATE(CFS)    =      46.15
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
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                              Irvine,Inc
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                Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Existing Condition, Drainage Area "B"                                 *
* 25-year Storm                                                         *
 ************************************************************************

  FILE NAME: E2.DAT
  TIME/DATE OF STUDY: 07:58 06/16/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================   ======  =====  ====== =====  =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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       1.00 TO NODE       2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =    587.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.172
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.574
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.26      0.20      1.000    81   15.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.69
  TOTAL AREA(ACRES) =      1.26   PEAK FLOW RATE(CFS) =      2.69

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    587.00  DOWNSTREAM(FEET) =    579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0348
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.69
  FLOW VELOCITY(FEET/SEC) =   3.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =  16.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  16.29
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.472
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.09      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.09      SUBAREA RUNOFF(CFS) =     2.23
  EFFECTIVE AREA(ACRES) =      2.35   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       4.80
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =         2.3  TC(MIN.) =     16.29
  EFFECTIVE AREA(ACRES) =       2.35  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       4.80
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                     *
* Existing Condition, Drainage Area "B"                                  *
* 25-year Storm                                                          *
 ************************************************************************

  FILE NAME: E1.DAT
  TIME/DATE OF STUDY: 07:56 06/16/2011
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE      10.00 TO NODE      11.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.745
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.840
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        0.71      0.20      1.000    81   12.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.69
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      1.69

******************************************************************************
  FLOW PROCESS FROM NODE      11.00 TO NODE      12.00 IS CODE =  61
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  610.00  DOWNSTREAM ELEVATION(FEET) =  582.00
  STREET LENGTH(FEET) =   489.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.60

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.60
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.44
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
  STREET FLOW TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =  14.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.602
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.07      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    2.31
  EFFECTIVE AREA(ACRES) =      1.78    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       3.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.43
  FLOW VELOCITY(FEET/SEC.) =  4.07   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     755.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =         1.8  TC(MIN.) =     14.88
 EFFECTIVE AREA(ACRES) =       1.78  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       3.85
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

  ************************* DESCRIPTION OF STUDY *************************
 * Serrano Highlands Hydrology Analysis                                  *
 * Existing Condition, Drainage Area "B"                                 *
 * 25-year Storm                                                         *
  ************************************************************************

   FILE NAME: SERRANOE.DAT
   TIME/DATE OF STUDY: 10:00 07/22/2011
 ========================================================================
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                       --*TIME-OF-CONCENTRATION MODEL*--

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

   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
 NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
 ===  =====  =========  =================  ======  ===== ====== ===== =======
   1   14.0       9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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     20.00 TO NODE     21.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
   ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.837
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.113
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   NATURAL GOOD COVER
   "OPEN BRUSH"                C        0.32      0.25     1.000    75   10.84
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      0.82
   TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      0.82

 ************************************************************************
   FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
 ------------------------------------------------------------------------
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    572.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   879.00   CHANNEL SLOPE =  0.0887
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.82
   FLOW VELOCITY(FEET/SEC) =   4.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =   3.28   Tc(MIN.) =  14.12
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1082.00 FEET.

 ************************************************************************
   FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
 ------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ========================================================================
   MAINLINE Tc(MIN) =  14.12
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.681
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL GOOD COVER
   "OPEN BRUSH"                D        6.00      0.20     1.000    81
   NATURAL GOOD COVER
   "OPEN BRUSH"                C        0.28      0.25     1.000    75
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    6.28      SUBAREA RUNOFF(CFS) =   14.01
   EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
   AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      14.71
 ========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        6.6  TC(MIN.) =     14.12
   EFFECTIVE AREA(ACRES) =      6.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
   AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =      14.71
 ========================================================================
 ========================================================================
```

END OF RATIONAL METHOD ANALYSIS

C. 100-YEAR STORM

```
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Existing Condition, Drainage Area "A"                                 *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: E3.DAT
  TIME/DATE OF STUDY: 07:56 06/16/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020    0.50    1.50 0.0313 0.125 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     30.00 TO NODE     31.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    640.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  12.853
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.602
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        1.00      0.20      1.000    95   12.85
  NATURAL GOOD COVER
  "OPEN BRUSH"              B        0.23      0.30      1.000    81   12.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.75
  TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      3.75

************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1122.00   CHANNEL SLOPE =  0.0588
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.75
  FLOW VELOCITY(FEET/SEC) =   4.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.91   Tc(MIN.) =  16.76
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1422.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN) =  16.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.094
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"              D       10.80      0.20      1.000    95
  NATURAL GOOD COVER
  "OPEN BRUSH"              C        3.10      0.25      1.000    91
  NATURAL GOOD COVER
  "OPEN BRUSH"              B        8.50      0.30      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.40      SUBAREA RUNOFF(CFS) =   57.44
  EFFECTIVE AREA(ACRES) =    23.63   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      23.6       PEAK FLOW RATE(CFS) =      60.62
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       23.6  TC(MIN.) =     16.76
  EFFECTIVE AREA(ACRES) =     23.63  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
```

```
  PEAK FLOW RATE(CFS)    =      60.62
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
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                              Irvine,Inc
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          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Existing Condition, Drainage Area "B"                                 *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: E2.DAT
  TIME/DATE OF STUDY: 07:59 06/16/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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       1.00 TO NODE       2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =    587.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.172
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.275
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.26      0.20      1.000    95   15.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.49
  TOTAL AREA(ACRES) =      1.26   PEAK FLOW RATE(CFS) =      3.49

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    587.00  DOWNSTREAM(FEET) =    579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0348
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.49
  FLOW VELOCITY(FEET/SEC) =   3.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =  16.23
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  16.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.151
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.09      0.20      1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.09      SUBAREA RUNOFF(CFS) =     2.90
  EFFECTIVE AREA(ACRES) =      2.35   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       6.24
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        2.3  TC(MIN.) =     16.23
  EFFECTIVE AREA(ACRES) =      2.35  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       6.24
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Existing Condition, Drainage Area "B"                                 *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: E1.DAT
  TIME/DATE OF STUDY: 07:57 06/16/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================   ======  =====  ====  ====  =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  12.745
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.620
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D       0.71     0.20      1.000     95   12.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.19
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.19

**************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  610.00  DOWNSTREAM ELEVATION(FEET) =  582.00
  STREET LENGTH(FEET) =   489.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.60

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.60
  INSIDE STREET CROSSFALL(DECIMAL) =  0.017
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    6.33
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
  STREET FLOW TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =  14.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.324
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D       1.07     0.20      1.000     95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    3.01
  EFFECTIVE AREA(ACRES) =      1.78    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       5.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.41
  FLOW VELOCITY(FEET/SEC.) =  4.25   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     755.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =         1.8  TC(MIN.) =     14.78
 EFFECTIVE AREA(ACRES) =       1.78  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       5.01
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Serrano Highlands Hydrology Analysis                                  *
* Existing Condition, Drainage Area "B"                                 *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: SERRANOE.DAT
  TIME/DATE OF STUDY: 08:34 07/21/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020    0.50    1.50 0.0313 0.125 0.0150

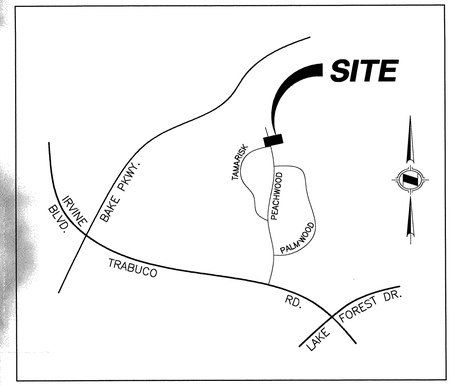
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  10.837
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.972
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                C        0.32      0.25      1.000    91   10.84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      1.07

**************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    572.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   879.00   CHANNEL SLOPE =  0.0887
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.07
  FLOW VELOCITY(FEET/SEC) =   4.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =  14.07
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1082.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  14.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.420
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        6.00      0.20      1.000    95
  NATURAL GOOD COVER
  "OPEN BRUSH"                C        0.28      0.25      1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     6.28      SUBAREA RUNOFF(CFS) =   18.19
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      19.10
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        6.6  TC(MIN.) =     14.07
  EFFECTIVE AREA(ACRES) =      6.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      19.10
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

VICINITY MAP



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 25 — NODE NUMBER
- A / 1.23 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- ΣQ_{25} =2.4cfs, t=12.9 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- FLOW LINE
- EXISTING STORM DRAIN
- SOIL GROUP

PREPARED BY:

H&A

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EXISTING HYDROLOGY MAP

TT# 15594

AREA "A"

AREA "B"

B / 0.32 — A / 1.23 — B / 0.71 — B / 1.07 — B / 1.26 — B / 6.28 — B / 1.09 — A / 22.4

30 — 31 — 20 — 21 — 10 — 11 — 1 — 2 — 3 — 12 — 22 — 32

ΣQ_{25} =2.9cfs, ΣQ_{100}=3.8cfs, t=12.9

ΣQ_{10} =0.8cfs, ΣQ_{100}=1.1cfs, t=10.8

ΣQ_{25} =1.7cfs, ΣQ_{100}=2.2cfs, t=12.7

ΣQ_{25} =2.7cfs, ΣQ_{100}=3.5cfs, t=15.2

ΣQ_{25} =4.8cfs, ΣQ_{100}=6.2cfs, t=16.3

ΣQ_{25} =3.9cfs, ΣQ_{100}=5.0cfs, t=14.9

ΣQ_{25} =14.7cfs, ΣQ_{100}=19.1cfs, t=14.1

ΣQ_{25} =46.2cfs, ΣQ_{100}=60.6cfs, t=17.0

P/L — P/L

EX. 18" RCP SD PER IMPROVEMENT PLANS FOR TRACT 10931

EX. 30" RCP SD PER IMPROVEMENT PLANS FOR TRACT 12603

GRAPHIC SCALE 1"=60'

JUL 22 2011

F:\0319\Engineering\SY-Hydrology\Existing_Hydrology.dwg

WO: 0945-SY TTM # 15594

SECTION 3

PROPOSED CONDITION
HYDROLOGY CALCULATIONS AND MAP

A. 10-YEAR STORM

```
 ************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Proposed Condition, Drainage Area "A"                                 *
* 10-year Storm                                                         *
 ************************************************************************

  FILE NAME: SH_A.DAT
  TIME/DATE OF STUDY: 10:08 07/22/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   14.0       9.0   0.020/0.020/0.020    0.50    1.50 0.0313 0.125 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      20.00 TO NODE      21.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =     695.00  DOWNSTREAM(FEET) =     640.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.853
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.363
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.00      0.20      1.000    81   12.85
  NATURAL GOOD COVER
  "OPEN BRUSH"                B        0.23      0.30      1.000    63   12.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      2.37

************************************************************************
  FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     640.00  DOWNSTREAM(FEET) =     608.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0678
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.37
  FLOW VELOCITY(FEET/SEC) =   4.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =  14.55
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     772.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      22.00 TO NODE      22.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN) =  14.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.202
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                B        2.72      0.30      1.000    63
  NATURAL GOOD COVER
  "OPEN BRUSH"                C        0.87      0.25      1.000    75
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        2.70      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     6.29      SUBAREA RUNOFF(CFS) =    11.05
  EFFECTIVE AREA(ACRES) =      7.52   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =      13.24

************************************************************************
  FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.00  DOWNSTREAM(FEET) =   607.00
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.10
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.24
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  14.98
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     932.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.98
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.165
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.76      0.25      1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.35      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     3.70
 EFFECTIVE AREA(ACRES) =      9.63   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      16.69

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   607.00  DOWNSTREAM(FEET) =   598.50
 FLOW LENGTH(FEET) =   315.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.85
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.69
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =  15.47
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    1247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.125
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.22      0.20      0.400    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.518
 SUBAREA AREA(ACRES) =     1.52      SUBAREA RUNOFF(CFS) =     2.77
 EFFECTIVE AREA(ACRES) =     11.15   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.93
 TOTAL AREA(ACRES) =        11.1       PEAK FLOW RATE(CFS) =      19.11

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.125
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    56
 COMMERCIAL                  D        0.16      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
 SUBAREA AREA(ACRES) =     0.32      SUBAREA RUNOFF(CFS) =     0.59
 EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =        11.5       PEAK FLOW RATE(CFS) =      19.71

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   598.50  DOWNSTREAM(FEET) =   598.00
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.71
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  15.57
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     31.00 =    1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.57
 RAINFALL INTENSITY(INCH/HR) =   2.12
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24
 AREA-AVERAGED Ap =  0.92
 EFFECTIVE STREAM AREA(ACRES) =      11.47
 TOTAL STREAM AREA(ACRES) =      11.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.71

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
 ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    645.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.566
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.511
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.44      0.25     1.000    75   11.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.90
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      0.90

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    620.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =  0.1471
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.90
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =  12.16
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     28.00 =     400.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.16
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.439
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.59      0.25     1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.66      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.25      SUBAREA RUNOFF(CFS) =     2.49
 EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       3.36

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   620.00  DOWNSTREAM(FEET) =   610.00
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.36
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  12.24
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     29.00 =     465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.430
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.21      0.25     1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.74      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.95      SUBAREA RUNOFF(CFS) =     1.90
 EFFECTIVE AREA(ACRES) =      2.64   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       5.24

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =   602.00
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.63
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        5.24
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =  12.49
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     30.00 =     620.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.49
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.403
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.66      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     1.38
 EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       6.56

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   602.00  DOWNSTREAM(FEET) =   598.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        6.56
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  12.51
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     31.00 =     645.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.51
 RAINFALL INTENSITY(INCH/HR) =   2.40
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  0.88
 EFFECTIVE STREAM AREA(ACRES) =       3.30
 TOTAL STREAM AREA(ACRES) =       3.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       19.71  15.57    2.117  0.24( 0.22) 0.92       11.5       20.00
     2        6.56  12.51    2.400  0.22( 0.19) 0.88        3.3       26.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       24.75  12.51    2.400  0.23( 0.21) 0.91       12.5       26.00
     2       25.42  15.57    2.117  0.23( 0.21) 0.91       14.8       20.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      25.42    Tc(MIN.) =    15.57
 EFFECTIVE AREA(ACRES) =      14.77   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.91
 TOTAL AREA(ACRES) =       14.8
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     31.00 =    1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   598.00  DOWNSTREAM(FEET) =   595.50
 FLOW LENGTH(FEET) =   111.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.61
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.42
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  15.73
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     32.00 =    1408.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.73
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.105
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.89      0.30      0.400    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     1.59
 EFFECTIVE AREA(ACRES) =     15.66   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.88
```

```
 TOTAL AREA(ACRES) =       15.7       PEAK FLOW RATE(CFS) =      26.76

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   595.50  DOWNSTREAM(FEET) =   594.50
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.76
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  15.78
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     33.00 =    1443.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.78
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.35      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.62      0.20      0.400    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.20      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.455
 SUBAREA AREA(ACRES) =     2.17      SUBAREA RUNOFF(CFS) =     3.88
 EFFECTIVE AREA(ACRES) =     17.83   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.83
 TOTAL AREA(ACRES) =       17.8       PEAK FLOW RATE(CFS) =      30.59

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       30.64  12.72     2.378  0.24( 0.19) 0.81       15.6       26.00
     2       30.59  15.78     2.101  0.24( 0.20) 0.83       17.8       20.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      30.64  Tc(MIN.) =  12.72
 AREA-AVERAGED Fm(INCH/HR) =  0.19  AREA-AVERAGED Fp(INCH/HR) =  0.24
 AREA-AVERAGED Ap =  0.81  EFFECTIVE AREA(ACRES) =      15.57

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   594.00  DOWNSTREAM(FEET) =   590.50
 FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.33
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      30.64
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  12.91
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     34.00 =    1588.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.91
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.357
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        1.68      0.25      1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.00      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.68      SUBAREA RUNOFF(CFS) =     5.13
 EFFECTIVE AREA(ACRES) =     18.25   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.84
 TOTAL AREA(ACRES) =       20.5       PEAK FLOW RATE(CFS) =      35.47

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   590.50  DOWNSTREAM(FEET) =   581.00
 FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.48
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.47
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  13.02
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     35.00 =    1718.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.02
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.346
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
```

```
  "OPEN BRUSH"                B        0.26      0.30     1.000    63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.26      SUBAREA RUNOFF(CFS) =     0.48
  EFFECTIVE AREA(ACRES) =     18.51   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       20.8       PEAK FLOW RATE(CFS) =      35.76

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   581.00  DOWNSTREAM(FEET) =   571.00
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.76
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  13.11
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     36.00 =    1833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.336
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                B        0.76      0.30     1.000    63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.76      SUBAREA RUNOFF(CFS) =     1.39
  EFFECTIVE AREA(ACRES) =     19.27   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       21.5       PEAK FLOW RATE(CFS) =      37.00
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       21.5  TC(MIN.) =     13.11
  EFFECTIVE AREA(ACRES) =     19.27  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 0.850
  PEAK FLOW RATE(CFS)    =      37.00

  ** PEAK FLOW RATE TABLE **
   STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       37.00  13.11    2.336  0.24( 0.20) 0.85       19.3       26.00
      2       36.17  16.18    2.072  0.24( 0.20) 0.86       21.5       20.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Proposed Condition, Drainage "B"                                      *
* 10-year Storm                                                         *
 ************************************************************************

  FILE NAME: SH_B.DAT
  TIME/DATE OF STUDY: 08:06 07/21/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================  ======  =====  ====== =====  =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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       1.00 TO NODE       2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.837
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.606
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                C        0.32      0.25      1.000    75   10.84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      0.68

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.1522
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.68
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =  11.64
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE       3.00 =     433.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  11.64
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.501
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.00      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.00      SUBAREA RUNOFF(CFS) =     2.07
  EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       2.72

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   308.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
```

```
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  42.98
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.72
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.67
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     498.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.67
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.498
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.37      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.37      SUBAREA RUNOFF(CFS) =     0.77
 EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       3.48

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.00  DOWNSTREAM(FEET) =   605.50
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.29
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.48
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  11.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     598.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.90
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.470
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.28      0.25      0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.20      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.48      SUBAREA RUNOFF(CFS) =     3.18
 EFFECTIVE AREA(ACRES) =      3.17   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.72
 TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       6.62

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.90
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.470
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.13      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.13      SUBAREA RUNOFF(CFS) =     2.43
 EFFECTIVE AREA(ACRES) =      4.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       9.05

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.50  DOWNSTREAM(FEET) =   605.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.02
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.05
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  12.06
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     658.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.06
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.451
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.36      0.25      1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.16      0.20      1.000    81
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.52      SUBAREA RUNOFF(CFS) =     1.04
 EFFECTIVE AREA(ACRES) =      4.82   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      10.01

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   591.00
 FLOW LENGTH(FEET) =   415.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.01
 PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =  12.70
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1073.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.70
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.379
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.16      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.66      0.25      0.400    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     1.68
 EFFECTIVE AREA(ACRES) =      5.64   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      11.38

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.70
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.379
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.69      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.50      0.25      0.400    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.19      SUBAREA RUNOFF(CFS) =     2.43
 EFFECTIVE AREA(ACRES) =      6.83   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =        6.8       PEAK FLOW RATE(CFS) =      13.81

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   591.00  DOWNSTREAM(FEET) =   580.50
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.22
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.81
 PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  13.21
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.21
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.327
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.92      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.92      SUBAREA RUNOFF(CFS) =     1.86
 EFFECTIVE AREA(ACRES) =      7.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.57
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      15.34

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.21
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.327
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.77      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.77      SUBAREA RUNOFF(CFS) =     1.56
 EFFECTIVE AREA(ACRES) =      8.52   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =        8.5       PEAK FLOW RATE(CFS) =      16.90

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   580.50  DOWNSTREAM(FEET) =   580.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.90
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  13.33
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.33
 RAINFALL INTENSITY(INCH/HR) =   2.31
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       8.52
 TOTAL STREAM AREA(ACRES) =       8.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.90

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
 ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.745
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.375
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                D       0.75      0.20      1.000    81   12.74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.47
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      1.47

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  610.00  DOWNSTREAM ELEVATION(FEET) =  584.00
 STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.60

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.60
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.71
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    5.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.52
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.04
 STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =  14.02
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.249
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D       2.30      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =     4.49
 EFFECTIVE AREA(ACRES) =      3.05    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       5.87

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.51
 FLOW VELOCITY(FEET/SEC.) =  4.89   DEPTH*VELOCITY(FT*FT/SEC.) =   1.26
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     611.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   584.00  DOWNSTREAM(FEET) =   583.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.00
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        5.87
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  14.06
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     636.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.06
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.245
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.77      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.77      SUBAREA RUNOFF(CFS) =     1.50
 EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =         3.8       PEAK FLOW RATE(CFS) =       7.36

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   583.00  DOWNSTREAM(FEET) =   580.00
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.21
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        7.36
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  14.16
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     701.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.16
 RAINFALL INTENSITY(INCH/HR) =   2.24
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       3.82
 TOTAL STREAM AREA(ACRES) =       3.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.36

 ** CONFLUENCE DATA **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       16.90  13.33    2.314  0.22( 0.12) 0.56       8.5       1.00
     2        7.36  14.16    2.236  0.20( 0.10) 0.52       3.8      10.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       24.09  13.33    2.314  0.21( 0.12) 0.54      12.1       1.00
     2       23.66  14.16    2.236  0.21( 0.12) 0.54      12.3      10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      24.09    Tc(MIN.) =    13.33
 EFFECTIVE AREA(ACRES) =      12.12   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       12.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1468.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       12.3  TC(MIN.) =     13.33
 EFFECTIVE AREA(ACRES) =     12.12  AREA-AVERAGED Fm(INCH/HR)=  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.544
 PEAK FLOW RATE(CFS)    =      24.09

 ** PEAK FLOW RATE TABLE **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       24.09  13.33    2.314  0.21( 0.12) 0.54      12.1       1.00
     2       23.66  14.16    2.236  0.21( 0.12) 0.54      12.3      10.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

B. 25-YEAR STORM

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for Serrano Highlands, Tract 15594                  *
* Proposed Condition, Drainage Area "A"                               *
* 25-year Storm                                                       *
 **********************************************************************

  FILE NAME: SH_A.DAT
  TIME/DATE OF STUDY: 17:59 07/18/2011
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================   ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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      20.00 TO NODE      21.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    640.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.853
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.827
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    81   12.85
  NATURAL GOOD COVER
  "OPEN BRUSH"               B        0.23      0.30      1.000    63   12.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.89
  TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      2.89

**************************************************************************
  FLOW PROCESS FROM NODE      21.00 TO NODE      22.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    608.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0678
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.89
  FLOW VELOCITY(FEET/SEC) =   4.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =  14.48
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     772.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      22.00 TO NODE      22.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  14.48
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.643
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               B        2.72      0.30      1.000    63
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        0.87      0.25      1.000    75
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        2.70      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     6.29      SUBAREA RUNOFF(CFS) =   13.55
  EFFECTIVE AREA(ACRES) =      7.52   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =      16.23

**************************************************************************
  FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.00  DOWNSTREAM(FEET) =   607.00
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.30
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.23
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =  14.90
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     932.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.600
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.76      0.25      1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.35      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     4.52
 EFFECTIVE AREA(ACRES) =      9.63   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      20.46

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   607.00  DOWNSTREAM(FEET) =   598.50
 FLOW LENGTH(FEET) =   315.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.74
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.46
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  15.35
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    1247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.35
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.557
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.22      0.20      0.400    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.518
 SUBAREA AREA(ACRES) =     1.52      SUBAREA RUNOFF(CFS) =     3.36
 EFFECTIVE AREA(ACRES) =     11.15   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.93
 TOTAL AREA(ACRES) =       11.1       PEAK FLOW RATE(CFS) =      23.45

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.35
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.557
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    56
 COMMERCIAL                  D        0.16      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
 SUBAREA AREA(ACRES) =     0.32      SUBAREA RUNOFF(CFS) =     0.72
 EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      24.16

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   598.50  DOWNSTREAM(FEET) =   598.00
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.44
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.16
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  15.44
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     31.00 =    1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.44
 RAINFALL INTENSITY(INCH/HR) =   2.55
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24
 AREA-AVERAGED Ap =  0.92
 EFFECTIVE STREAM AREA(ACRES) =      11.47
 TOTAL STREAM AREA(ACRES) =      11.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.16

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
 ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    645.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.566
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.001
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.44      0.25     1.000     75   11.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.09
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.09

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    620.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =  0.1471
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.09
 FLOW VELOCITY(FEET/SEC) =   4.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =  12.15
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     28.00 =     400.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.918
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.59      0.25     1.000     75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.66      0.20     1.000     81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.25      SUBAREA RUNOFF(CFS) =     3.03
 EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      1.7       PEAK FLOW RATE(CFS) =       4.09

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   620.00  DOWNSTREAM(FEET) =   610.00
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.61
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.09
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  12.23
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     29.00 =     465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.908
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.21      0.25     1.000     75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.74      0.20     1.000     81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.95      SUBAREA RUNOFF(CFS) =     2.31
 EFFECTIVE AREA(ACRES) =      2.64   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      2.6       PEAK FLOW RATE(CFS) =       6.38

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =   602.00
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.23
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        6.38
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =  12.46
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     30.00 =     620.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.46
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.877
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.66      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     1.66
 EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =         3.3       PEAK FLOW RATE(CFS) =        7.97

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   602.00  DOWNSTREAM(FEET) =   598.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.95
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        7.97
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  12.48
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     31.00 =     645.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.48
 RAINFALL INTENSITY(INCH/HR) =   2.87
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  0.88
 EFFECTIVE STREAM AREA(ACRES) =       3.30
 TOTAL STREAM AREA(ACRES) =       3.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.97

 ** CONFLUENCE DATA **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       24.16  15.44    2.548  0.24( 0.22) 0.92       11.5      20.00
     2        7.97  12.48    2.874  0.22( 0.19) 0.88        3.3      26.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       30.23  12.48    2.874  0.23( 0.21) 0.91       12.6      26.00
     2       31.16  15.44    2.548  0.23( 0.21) 0.91       14.8      20.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       31.16    Tc(MIN.) =    15.44
 EFFECTIVE AREA(ACRES) =      14.77   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.91
 TOTAL AREA(ACRES) =       14.8
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     31.00 =    1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   598.00  DOWNSTREAM(FEET) =   595.50
 FLOW LENGTH(FEET) =   111.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.98
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       31.16
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  15.60
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     32.00 =    1408.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.60
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.533
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.89      0.30      0.400    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     1.93
 EFFECTIVE AREA(ACRES) =     15.66   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =       15.7       PEAK FLOW RATE(CFS) =       32.80
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   595.50  DOWNSTREAM(FEET) =   594.50
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.39
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      32.80
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  15.64
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     33.00 =    1443.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.64
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.529
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.35      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.62      0.20      0.400    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.20      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.455
 SUBAREA AREA(ACRES) =     2.17      SUBAREA RUNOFF(CFS) =     4.71
 EFFECTIVE AREA(ACRES) =     17.83   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.83
 TOTAL AREA(ACRES) =       17.8       PEAK FLOW RATE(CFS) =       37.45

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   594.00  DOWNSTREAM(FEET) =   590.50
 FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.10
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.45
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  15.83
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     34.00 =    1588.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.83
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        1.68      0.25      1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.00      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.68      SUBAREA RUNOFF(CFS) =     5.50
 EFFECTIVE AREA(ACRES) =     20.51   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =       20.5       PEAK FLOW RATE(CFS) =       42.69

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       43.29  12.86     2.825  0.24( 0.20) 0.84      18.3       26.00
     2       42.69  15.83     2.513  0.24( 0.20) 0.85      20.5       20.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      43.29  Tc(MIN.) =  12.86
 AREA-AVERAGED Fm(INCH/HR) =  0.20  AREA-AVERAGED Fp(INCH/HR) =  0.24
 AREA-AVERAGED Ap =  0.84  EFFECTIVE AREA(ACRES) =      18.31

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   590.50  DOWNSTREAM(FEET) =   581.00
 FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.69
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      43.29
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.97
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     35.00 =    1718.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.97
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.812
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                B        0.26      0.30      1.000    63
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.26      SUBAREA RUNOFF(CFS) =     0.59
  EFFECTIVE AREA(ACRES) =     18.57   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       20.8       PEAK FLOW RATE(CFS) =      43.67

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   581.00  DOWNSTREAM(FEET) =   571.00
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.56
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.67
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  13.06
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     36.00 =    1833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.06
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.802
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                B        0.76      0.30      1.000    63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.76      SUBAREA RUNOFF(CFS) =     1.71
  EFFECTIVE AREA(ACRES) =     19.33   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       21.5       PEAK FLOW RATE(CFS) =      45.20
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       21.5  TC(MIN.) =     13.06
  EFFECTIVE AREA(ACRES) =     19.33  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 0.850
  PEAK FLOW RATE(CFS)    =      45.20

  ** PEAK FLOW RATE TABLE **
   STREAM       Q     Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       45.20  13.06    2.802  0.24( 0.20) 0.85      19.3       26.00
      2       44.38  16.02    2.495  0.24( 0.20) 0.86      21.5       20.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Proposed Condition, Drainage "B"                                      *
* 25-year Storm                                                         *
 ************************************************************************

  FILE NAME: SH_B.DAT
  TIME/DATE OF STUDY: 16:23 07/21/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020    0.50    1.50 0.0313 0.125 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      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.837
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.113
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        0.32      0.25      1.000    75   10.84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      0.82

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.1522
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.82
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =  11.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     433.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  11.64
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.989
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.51
  EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.30

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   308.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
```

```
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  45.59
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.30
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.67
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     498.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.67
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.37      0.20      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.37      SUBAREA RUNOFF(CFS) =     0.93
 EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       4.22

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.00  DOWNSTREAM(FEET) =   605.50
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.71
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.22
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  11.88
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     598.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.88
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.28      0.25      0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.20      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.48      SUBAREA RUNOFF(CFS) =     3.82
 EFFECTIVE AREA(ACRES) =      3.17   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.72
 TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       8.00

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.88
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.13      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.13      SUBAREA RUNOFF(CFS) =     2.92
 EFFECTIVE AREA(ACRES) =      4.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      10.92

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.50  DOWNSTREAM(FEET) =   605.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.47
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.92
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  12.04
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     658.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.04
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.933
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.36      0.25      1.000    75
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.16      0.20      1.000    81
```

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 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.52      SUBAREA RUNOFF(CFS) =     1.26
 EFFECTIVE AREA(ACRES) =      4.82   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      12.10

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   591.00
 FLOW LENGTH(FEET) =   415.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.31
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  12.65
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1073.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.65
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.852
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.16      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.66      0.25      0.400    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     2.03
 EFFECTIVE AREA(ACRES) =      5.64   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      13.78

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.65
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.852
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.69      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.50      0.25      0.400    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.19      SUBAREA RUNOFF(CFS) =     2.94
 EFFECTIVE AREA(ACRES) =      6.83   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =        6.8       PEAK FLOW RATE(CFS) =      16.72

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   591.00  DOWNSTREAM(FEET) =   580.50
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.57
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.72
 PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  13.14
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.14
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.792
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.92      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.92      SUBAREA RUNOFF(CFS) =     2.25
 EFFECTIVE AREA(ACRES) =      7.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.57
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      18.59

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.14
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.792
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.77      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
```

```
 SUBAREA AREA(ACRES) =     0.77      SUBAREA RUNOFF(CFS) =     1.88
 EFFECTIVE AREA(ACRES) =      8.52   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =         8.5       PEAK FLOW RATE(CFS) =      20.47

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   580.50  DOWNSTREAM(FEET) =   580.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.63
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.47
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  13.26
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.26
 RAINFALL INTENSITY(INCH/HR) =   2.78
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       8.52
 TOTAL STREAM AREA(ACRES) =       8.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.47

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
 ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.745
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.840
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.75      0.20      1.000     81   12.74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.78
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      1.78

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  610.00  DOWNSTREAM ELEVATION(FEET) =  584.00
 STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.60

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.60
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.49
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.24
  HALFSTREET FLOOD WIDTH(FEET) =    6.53
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.64
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =  13.98
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.695
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        2.30      0.20      0.400     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =     5.41
 EFFECTIVE AREA(ACRES) =      3.05    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =         3.0       PEAK FLOW RATE(CFS) =       7.10

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.20
 FLOW VELOCITY(FEET/SEC.) =  5.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.38
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     611.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   584.00  DOWNSTREAM(FEET) =   583.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
```

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 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.53
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        7.10
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  14.02
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     636.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.02
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.691
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.77      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.77      SUBAREA RUNOFF(CFS) =     1.81
 EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       8.90

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   583.00  DOWNSTREAM(FEET) =   580.00
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.79
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        8.90
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  14.11
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     701.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.11
 RAINFALL INTENSITY(INCH/HR) =   2.68
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       3.82
 TOTAL STREAM AREA(ACRES) =       3.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.90

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       20.47  13.26    2.777  0.22( 0.12) 0.56       8.5        1.00
     2        8.90  14.11    2.681  0.20( 0.10) 0.52       3.8       10.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       29.14  13.26    2.777  0.21( 0.12) 0.54      12.1        1.00
     2       28.62  14.11    2.681  0.21( 0.12) 0.54      12.3       10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      29.14    Tc(MIN.) =    13.26
 EFFECTIVE AREA(ACRES) =      12.11   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       12.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1468.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       12.3  TC(MIN.) =     13.26
 EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR)=  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.544
 PEAK FLOW RATE(CFS)    =      29.14

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       29.14  13.26    2.777  0.21( 0.12) 0.54      12.1        1.00
     2       28.62  14.11    2.681  0.21( 0.12) 0.54      12.3       10.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

C. 100-YEAR STORM

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

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 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for Serrano Highlands, Tract 15594                  *
* Proposed Condition, Drainage Area "A"                               *
* 100-year Storm                                                      *
 **********************************************************************

  FILE NAME: SH_A.DAT
  TIME/DATE OF STUDY: 17:59 07/18/2011
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   14.0       9.0   0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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     20.00 TO NODE     21.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    640.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.853
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.602
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    95   12.85
  NATURAL GOOD COVER
  "OPEN BRUSH"               B        0.23      0.30      1.000    81   12.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.75
  TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      3.75

**************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    608.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0678
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.75
  FLOW VELOCITY(FEET/SEC) =   5.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =  14.38
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     772.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               B        2.72      0.30      1.000    81
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        0.87      0.25      1.000    91
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        2.70      0.20      1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.29      SUBAREA RUNOFF(CFS) =   17.70
  EFFECTIVE AREA(ACRES) =      7.52   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =      21.20

**************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.00  DOWNSTREAM(FEET) =   607.00
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.20
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  14.78
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     932.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN) =  14.78
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.325
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.76      0.25      1.000    91
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.35      0.20      1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     5.90
 EFFECTIVE AREA(ACRES) =      9.63   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         9.6       PEAK FLOW RATE(CFS) =      26.75

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   607.00  DOWNSTREAM(FEET) =   598.50
 FLOW LENGTH(FEET) =   315.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.61
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.75
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =  15.19
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    1247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN) =  15.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.273
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.22      0.20      0.400    91
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.518
 SUBAREA AREA(ACRES) =     1.52      SUBAREA RUNOFF(CFS) =     4.34
 EFFECTIVE AREA(ACRES) =     11.15   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.93
 TOTAL AREA(ACRES) =        11.1       PEAK FLOW RATE(CFS) =      30.63

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN) =  15.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.273
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    76
 COMMERCIAL                  D        0.16      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
 SUBAREA AREA(ACRES) =     0.32      SUBAREA RUNOFF(CFS) =     0.92
 EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =        11.5       PEAK FLOW RATE(CFS) =      31.55

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   598.50  DOWNSTREAM(FEET) =   598.00
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.55
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  15.29
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     31.00 =    1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.29
 RAINFALL INTENSITY(INCH/HR) =   3.26
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.24
 AREA-AVERAGED Ap =  0.92
 EFFECTIVE STREAM AREA(ACRES) =      11.47
 TOTAL STREAM AREA(ACRES) =      11.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      31.55

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
 ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    645.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.566
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.826
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BROWSH"                C        0.44      0.25     1.000    91   11.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.42

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    620.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =  0.1471
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.42
 FLOW VELOCITY(FEET/SEC) =   5.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =  12.12
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     28.00 =     400.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.12
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.724
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BROWSH"                C        0.59      0.25     1.000    91
 NATURAL GOOD COVER
 "OPEN BROWSH"                D        0.66      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.25      SUBAREA RUNOFF(CFS) =     3.94
 EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      1.7       PEAK FLOW RATE(CFS) =       5.31

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    610.00
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.77
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.31
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  12.19
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     29.00 =     465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.712
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BROWSH"                C        0.21      0.25     1.000    91
 NATURAL GOOD COVER
 "OPEN BROWSH"                D        0.74      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.95      SUBAREA RUNOFF(CFS) =     2.99
 EFFECTIVE AREA(ACRES) =      2.64   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      2.6       PEAK FLOW RATE(CFS) =       8.29

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    602.00
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.06
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.29
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =  12.41
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     30.00 =     620.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.41
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.676
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.66      0.20      0.400    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     2.14
 EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =         3.3       PEAK FLOW RATE(CFS) =      10.34

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   602.00  DOWNSTREAM(FEET) =   598.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.34
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  12.43
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     31.00 =     645.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.43
 RAINFALL INTENSITY(INCH/HR) =   3.67
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  0.88
 EFFECTIVE STREAM AREA(ACRES) =       3.30
 TOTAL STREAM AREA(ACRES) =       3.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.34

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1       31.55  15.29     3.261   0.24( 0.22) 0.92       11.5       20.00
     2       10.34  12.43     3.672   0.22( 0.19) 0.88        3.3       26.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1       39.45  12.43     3.672   0.23( 0.21) 0.91       12.6       26.00
     2       40.67  15.29     3.261   0.23( 0.21) 0.91       14.8       20.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      40.67    Tc(MIN.) =    15.29
 EFFECTIVE AREA(ACRES) =      14.77   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.91
 TOTAL AREA(ACRES) =       14.8
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     31.00 =    1297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   598.00  DOWNSTREAM(FEET) =   595.50
 FLOW LENGTH(FEET) =   111.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.89
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      40.67
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  15.43
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     32.00 =    1408.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.43
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.244
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.89      0.30      0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     2.50
 EFFECTIVE AREA(ACRES) =     15.66   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =       15.7       PEAK FLOW RATE(CFS) =      42.81
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   595.50  DOWNSTREAM(FEET) =   594.50
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.37
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.81
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  15.47
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     33.00 =    1443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  15.47
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.239
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.35      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.62      0.20      0.400    91
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.20      0.20      1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.455
  SUBAREA AREA(ACRES) =    2.17      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =    17.83   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =      17.8       PEAK FLOW RATE(CFS) =      48.84

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   594.00  DOWNSTREAM(FEET) =   590.50
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.01
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.84
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =  15.64
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     34.00 =    1588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  15.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.219
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        1.68      0.25      1.000    91
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.68      SUBAREA RUNOFF(CFS) =    7.21
  EFFECTIVE AREA(ACRES) =    20.51   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =      20.5       PEAK FLOW RATE(CFS) =      55.72

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
      1       56.44  12.79    3.613  0.24( 0.20) 0.84       18.4       26.00
      2       55.72  15.64    3.219  0.24( 0.20) 0.85       20.5       20.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      56.44  Tc(MIN.) =  12.79
  AREA-AVERAGED Fm(INCH/HR) =  0.20  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.84  EFFECTIVE AREA(ACRES) =      18.37

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   590.50  DOWNSTREAM(FEET) =   581.00
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.58
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.44
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.89
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     35.00 =    1718.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  12.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.597
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               B        0.26      0.30      1.000    81
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.26      SUBAREA RUNOFF(CFS) =     0.77
 EFFECTIVE AREA(ACRES) =     18.63   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.84
 TOTAL AREA(ACRES) =       20.8       PEAK FLOW RATE(CFS) =      56.95

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   581.00  DOWNSTREAM(FEET) =   571.00
 FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.34
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      56.95
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  12.97
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     36.00 =    1833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.583
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                B        0.76      0.30      1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.76      SUBAREA RUNOFF(CFS) =     2.25
 EFFECTIVE AREA(ACRES) =     19.39   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =       21.5       PEAK FLOW RATE(CFS) =      58.97
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       21.5  TC(MIN.) =     12.97
 EFFECTIVE AREA(ACRES) =     19.39  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 0.850
 PEAK FLOW RATE(CFS)    =      58.97

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1       58.97  12.97     3.583   0.24( 0.20) 0.85       19.4       26.00
    2       57.98  15.83     3.197   0.24( 0.20) 0.86       21.5       20.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Serrano Highlands, Tract 15594                    *
* Proposed Condition, Drainage "B"                                      *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: SH_B.DAT
  TIME/DATE OF STUDY: 16:48 07/21/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   14.0      9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 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      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.837
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.972
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                C        0.32      0.25     1.000     91   10.84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      1.07

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.1522
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.07
  FLOW VELOCITY(FEET/SEC) =   4.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =  11.63
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     433.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN) =  11.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.814
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.00      0.20     1.000     95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =     3.25
  EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       1.3    PEAK FLOW RATE(CFS) =       4.28

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   308.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  49.23
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.28
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  11.66
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     498.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.810
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.37      0.20      1.000     95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.37      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =      1.69   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       5.48

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.00  DOWNSTREAM(FEET) =   605.50
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.27
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.48
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  11.86
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     598.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.28      0.25      0.400     86
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.20      0.20      0.400     91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.48      SUBAREA RUNOFF(CFS) =     4.91
 EFFECTIVE AREA(ACRES) =      3.17   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.72
 TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =      10.33

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        1.13      0.20      0.400     91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.13      SUBAREA RUNOFF(CFS) =     3.76
 EFFECTIVE AREA(ACRES) =      4.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      14.09

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.50  DOWNSTREAM(FEET) =   605.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.68
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.09
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  12.01
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     658.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.01
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.745
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                C        0.36      0.25      1.000     91
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.16      0.20      1.000     95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.52      SUBAREA RUNOFF(CFS) =     1.64
 EFFECTIVE AREA(ACRES) =      4.82   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      15.63

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   591.00
 FLOW LENGTH(FEET) =   415.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.63
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  12.59
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1073.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.645
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    76
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.66      0.25      0.400    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     2.61
 EFFECTIVE AREA(ACRES) =      5.64   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      17.81

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.59
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.645
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.69      0.30      0.400    76
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.50      0.25      0.400    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.19      SUBAREA RUNOFF(CFS) =     3.78
 EFFECTIVE AREA(ACRES) =      6.83   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =        6.8       PEAK FLOW RATE(CFS) =      21.59

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   591.00  DOWNSTREAM(FEET) =   580.50
 FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.52
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.59
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =  13.04
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.04
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.572
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.92      0.20      0.400    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.92      SUBAREA RUNOFF(CFS) =     2.89
 EFFECTIVE AREA(ACRES) =      7.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.57
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      24.03

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.04
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.572
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.77      0.20      0.400    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.77      SUBAREA RUNOFF(CFS) =     2.42
```

```
 EFFECTIVE AREA(ACRES) =      8.52   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =         8.5       PEAK FLOW RATE(CFS) =      26.45

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   580.50  DOWNSTREAM(FEET) =   580.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.45
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  13.15
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1468.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.15
 RAINFALL INTENSITY(INCH/HR) =   3.55
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.22
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       8.52
 TOTAL STREAM AREA(ACRES) =       8.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.45

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   266.00
 ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.745
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.620
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                 D        0.75      0.20     1.000     95   12.74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.31
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      2.31

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  610.00  DOWNSTREAM ELEVATION(FEET) =  584.00
 STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.60

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.60
 INSIDE STREET CROSSFALL(DECIMAL) =  0.017
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.017

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.79
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.41
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.92
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.26
 STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =  13.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.442
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"        D        2.30      0.20     0.400     91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =     6.96
 EFFECTIVE AREA(ACRES) =      3.05    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =         3.0       PEAK FLOW RATE(CFS) =       9.15

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.28
 FLOW VELOCITY(FEET/SEC.) =  5.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.55
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     611.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   584.00  DOWNSTREAM(FEET) =   583.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.26
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.15
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  13.95
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     636.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.95
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.77      0.20      0.400    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.77      SUBAREA RUNOFF(CFS) =     2.33
 EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =      11.46

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   583.00  DOWNSTREAM(FEET) =   580.00
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.57
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.46
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  14.04
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     701.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.04
 RAINFALL INTENSITY(INCH/HR) =   3.42
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       3.82
 TOTAL STREAM AREA(ACRES) =       3.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.46

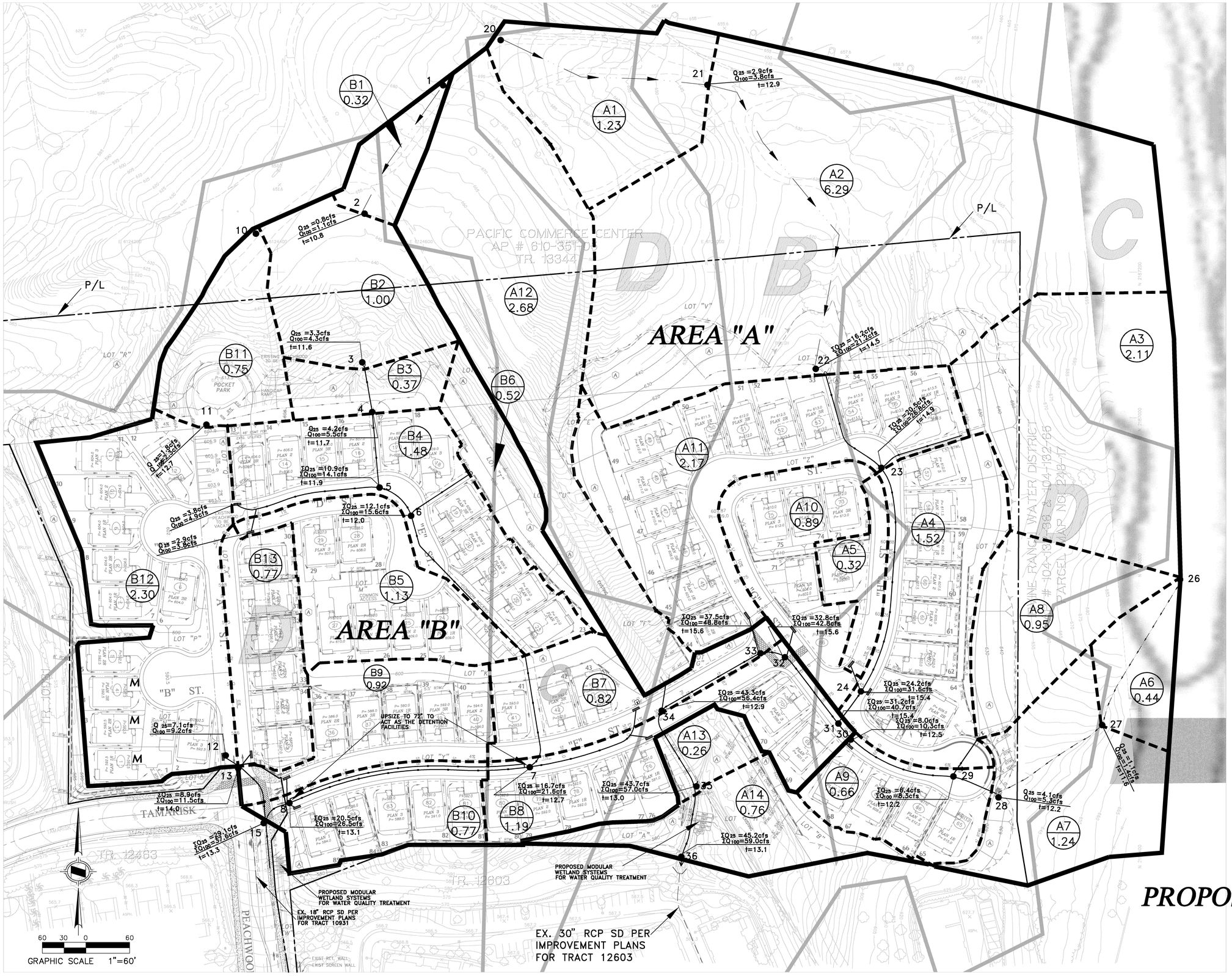
 ** CONFLUENCE DATA **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       26.45  13.15    3.555  0.22( 0.12) 0.56       8.5       1.00
     2       11.46  14.04    3.425  0.20( 0.10) 0.52       3.8      10.00

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

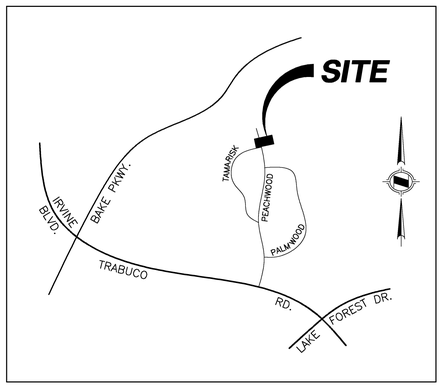
 ** PEAK FLOW RATE TABLE **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       37.61  13.15    3.555  0.21( 0.12) 0.54      12.1       1.00
     2       36.91  14.04    3.425  0.21( 0.12) 0.54      12.3      10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      37.61    Tc(MIN.) =    13.15
 EFFECTIVE AREA(ACRES) =      12.10   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       12.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1468.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       12.3  TC(MIN.) =     13.15
 EFFECTIVE AREA(ACRES) =     12.10  AREA-AVERAGED Fm(INCH/HR)=  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.544
 PEAK FLOW RATE(CFS)    =      37.61

 ** PEAK FLOW RATE TABLE **
  STREAM       Q     Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS) (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       37.61  13.15    3.555  0.21( 0.12) 0.54      12.1       1.00
     2       36.91  14.04    3.425  0.21( 0.12) 0.54      12.3      10.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```



VICINITY MAP



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 25 — NODE NUMBER
- A / 1.23 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- ΣQ25 =2.4cfs, t=12.9 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- FLOW LINE
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED BY:

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PROPOSED HYDROLOGY MAP

TT# 15594

WO: 0249-SX TTM # 15594

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SECTION 4

BASIN ROUTING ANALYSIS

12" PIPE W/6" DEPTH CAPACITY

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00100	ft/ft
Normal Depth	0.50	ft
Diameter	1.00	ft

Results

Discharge	0.56	ft^3/s
Flow Area	0.39	ft^2
Wetted Perimeter	1.57	ft
Top Width	1.00	ft
Critical Depth	0.31	ft
Percent Full	50.0	%
Critical Slope	0.00563	ft/ft
Velocity	1.43	ft/s
Velocity Head	0.03	ft
Specific Energy	0.53	ft
Froude Number	0.40	
Maximum Discharge	1.21	ft^3/s
Discharge Full	1.13	ft^3/s
Slope Full	0.00025	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

12" PIPE W/6" DEPTH CAPACITY

GVF Output Data

Normal Depth	0.50	ft
Critical Depth	0.31	ft
Channel Slope	0.00100	ft/ft
Critical Slope	0.00563	ft/ft

Rating Table for 12" Circular Orifice

Project Description

Solve For	Discharge

Input Data

Headwater Elevation	1.00	ft
Centroid Elevation	0.50	ft
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.60	
Diameter	1.00	ft

Headwater Elevation (ft)	Discharge (ft³/s)	Velocity (ft/s)
1.00	2.67	3.40
2.00	4.63	5.89
3.00	5.98	7.61
4.00	7.07	9.00
5.00	8.02	10.21
6.00	8.87	11.29
7.00	9.64	12.27
8.00	10.35	13.18
9.00	11.02	14.03
10.00	11.65	14.83

18' half street - 6" curb Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02610	ft/ft
Discharge	15.60	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.70
0+10	0.50
0+10	0.00
0+12	0.17
0+12	0.20
0+28	0.52

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.70)	(0+28, 0.52)	0.015

Results

Normal Depth		0.50	ft
Elevation Range	0.00 to 0.70		
Flow Area		3.10	ft²
Wetted Perimeter		17.60	ft
Top Width		17.17	ft
Normal Depth		0.50	ft
Critical Depth		0.62	ft
Critical Slope		0.00547	ft/ft
Velocity		5.03	ft/s
Velocity Head		0.39	ft
Specific Energy		0.89	ft
Froude Number		2.08	

18' half street - 6" curb Capacity

Results

Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.62	ft
Channel Slope	0.02610	ft/ft
Critical Slope	0.00547	ft/ft

A. 10-YEAR STORM

LOSS RATE AND LOW LOSS FRACTION FOR
TRACT 15591 AT NODE 7
10-YEAR STORM

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*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 3.68 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	0.68	100.00	75.	0.250	0.389
2	1.53	100.00	81.	0.200	0.504
3	0.85	40.00	56.	0.300	0.610
4	1.44	40.00	69.	0.250	0.677
5	2.33	40.00	75.	0.200	0.717

TOTAL AREA (Acres) = 6.83

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.133

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.385

==========

UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS
TTM 15591 FOR UPSIZING STORM DRAIN TO ACT AS DETENTION FACILITIES
10-YEAR STORM

UNIT HYDROGRAPH DEVELOPMENT

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 6.83
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.133
LOW LOSS FRACTION = 0.385
TIME OF CONCENTRATION(MIN.) = 12.70
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.72
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.95
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.59
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.20
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.68

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.27
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.82

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.13	0.0011	0.22 Q	.	.	.	.	
0.34	0.0049	0.22 Q	.	.	.	.	
0.55	0.0087	0.22 Q	.	.	.	.	
0.76	0.0125	0.22 Q	.	.	.	.	
0.97	0.0164	0.22 Q	.	.	.	.	
1.18	0.0203	0.22 Q	.	.	.	.	
1.40	0.0242	0.23 Q	.	.	.	.	
1.61	0.0282	0.23 Q	.	.	.	.	
1.82	0.0322	0.23 Q	.	.	.	.	
2.03	0.0363	0.23 Q	.	.	.	.	
2.24	0.0404	0.24 Q	.	.	.	.	
2.45	0.0445	0.24 Q	.	.	.	.	
2.67	0.0486	0.24 Q	.	.	.	.	
2.88	0.0528	0.24 Q	.	.	.	.	
3.09	0.0571	0.24 Q	.	.	.	.	
3.30	0.0614	0.25 Q	.	.	.	.	
3.51	0.0657	0.25 Q	.	.	.	.	
3.72	0.0701	0.25 Q	.	.	.	.	
3.94	0.0745	0.26 Q	.	.	.	.	
4.15	0.0790	0.26 Q	.	.	.	.	
4.36	0.0835	0.26 Q	.	.	.	.	
4.57	0.0881	0.26 Q	.	.	.	.	
4.78	0.0927	0.27 Q	.	.	.	.	
4.99	0.0974	0.27 Q	.	.	.	.	

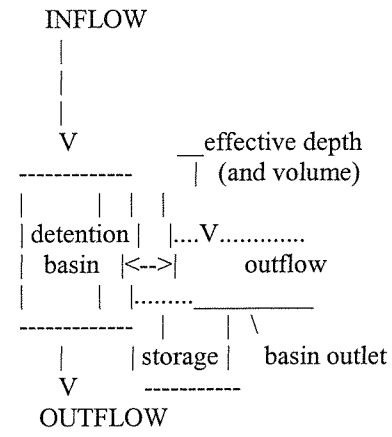
5.21	0.1022	0.27	Q	.	.	.	.
5.42	0.1070	0.28	Q	.	.	.	.
5.63	0.1118	0.28	Q	.	.	.	.
5.84	0.1168	0.28	Q	.	.	.	.
6.05	0.1217	0.29	Q	.	.	.	.
6.26	0.1268	0.29	Q	.	.	.	.
6.47	0.1319	0.30	Q	.	.	.	.
6.69	0.1371	0.30	Q	.	.	.	.
6.90	0.1424	0.30	Q	.	.	.	.
7.11	0.1477	0.31	Q	.	.	.	.
7.32	0.1531	0.31	Q	.	.	.	.
7.53	0.1586	0.32	Q	.	.	.	.
7.75	0.1642	0.32	Q	.	.	.	.
7.96	0.1699	0.33	Q	.	.	.	.
8.17	0.1757	0.33	Q	.	.	.	.
8.38	0.1815	0.34	Q	.	.	.	.
8.59	0.1875	0.35	Q	.	.	.	.
8.80	0.1936	0.35	Q	.	.	.	.
9.02	0.1997	0.36	Q	.	.	.	.
9.23	0.2060	0.36	Q	.	.	.	.
9.44	0.2125	0.37	Q	.	.	.	.
9.65	0.2190	0.38	Q	.	.	.	.
9.86	0.2257	0.39	Q	.	.	.	.
10.07	0.2325	0.39	Q	.	.	.	.
10.28	0.2395	0.40	Q	.	.	.	.
10.50	0.2466	0.41	Q	.	.	.	.
10.71	0.2539	0.42	Q	.	.	.	.
10.92	0.2614	0.43	Q	.	.	.	.
11.13	0.2691	0.45	Q	.	.	.	.
11.34	0.2770	0.45	Q	.	.	.	.
11.55	0.2851	0.47	Q	.	.	.	.
11.77	0.2934	0.48	Q	.	.	.	.
11.98	0.3020	0.50	.Q	.	.	.	.
12.19	0.3113	0.56	.Q	.	.	.	.
12.40	0.3221	0.67	.Q	.	.	.	.
12.61	0.3340	0.69	.Q	.	.	.	.
12.82	0.3463	0.72	.Q	.	.	.	.
13.04	0.3590	0.73	.Q	.	.	.	.
13.25	0.3721	0.77	.Q	.	.	.	.
13.46	0.3858	0.79	.Q	.	.	.	.
13.67	0.4001	0.84	.Q	.	.	.	.
13.88	0.4150	0.87	.Q	.	.	.	.
14.10	0.4307	0.93	.Q	.	.	.	.
14.31	0.4472	0.96	.Q	.	.	.	.
14.52	0.4649	1.05	. Q	.	.	.	.
14.73	0.4837	1.10	. Q	.	.	.	.
14.94	0.5041	1.23	. Q	.	.	.	.
15.15	0.5265	1.33	. Q	.	.	.	.
15.37	0.5530	1.71	. Q	.	.	.	.
15.58	0.5829	1.70	. Q	.	.	.	.
15.79	0.6213	2.69	. Q	.	.	.	.
16.00	0.6806	4.10	. Q	.	.	.	.
16.21	0.8369	13.77	.	.	.	Q	.	.
16.42	0.9747	1.99	. Q	.	.	.	.
16.64	1.0052	1.50	. Q	.	.	.	.
16.85	1.0284	1.16	. Q	.	.	.	.

17.06	1.0474	1.00	. Q	.	.	.	.
17.27	1.0640	0.90	.Q	.	.	.	.
17.48	1.0789	0.81	.Q	.	.	.	.
17.69	1.0926	0.75	.Q	.	.	.	.
17.91	1.1054	0.70	.Q	.	.	.	.
18.12	1.1173	0.66	.Q	.	.	.	.
18.33	1.1273	0.49	Q	.	.	.	.
18.54	1.1357	0.46	Q	.	.	.	.
18.75	1.1436	0.44	Q	.	.	.	.
18.96	1.1511	0.42	Q	.	.	.	.
19.17	1.1582	0.40	Q	.	.	.	.
19.39	1.1650	0.38	Q	.	.	.	.
19.60	1.1716	0.37	Q	.	.	.	.
19.81	1.1779	0.35	Q	.	.	.	.
20.02	1.1840	0.34	Q	.	.	.	.
20.23	1.1898	0.33	Q	.	.	.	.
20.44	1.1955	0.32	Q	.	.	.	.
20.66	1.2010	0.31	Q	.	.	.	.
20.87	1.2063	0.30	Q	.	.	.	.
21.08	1.2115	0.29	Q	.	.	.	.
21.29	1.2166	0.28	Q	.	.	.	.
21.50	1.2215	0.28	Q	.	.	.	.
21.72	1.2263	0.27	Q	.	.	.	.
21.93	1.2310	0.26	Q	.	.	.	.
22.14	1.2356	0.26	Q	.	.	.	.
22.35	1.2401	0.25	Q	.	.	.	.
22.56	1.2444	0.25	Q	.	.	.	.
22.77	1.2487	0.24	Q	.	.	.	.
22.98	1.2529	0.24	Q	.	.	.	.
23.20	1.2571	0.23	Q	.	.	.	.
23.41	1.2611	0.23	Q	.	.	.	.
23.62	1.2651	0.23	Q	.	.	.	.
23.83	1.2690	0.22	Q	.	.	.	.
24.04	1.2728	0.22	Q	.	.	.	.
24.25	1.2747	0.00	Q	.	.	.	.

BASIN ROUTING

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 12.700
DEAD STORAGE(AF) = 0.00
SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 12

*BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	**	BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	*
* 0.000	0.000	0.000**		0.500	0.008	0.560*	
* 1.000	0.023	2.670**		2.000	0.061	4.630*	
* 3.000	0.106	5.980**		4.000	0.152	7.070*	
* 5.000	0.189	8.020**		6.000	0.214	8.870*	
* 7.000	0.214	9.640**		8.000	0.214	10.350*	
* 9.000	0.214	11.020**		10.000	0.214	11.650*	

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.50	0.00270	0.01250
3	1.00	-0.00065	0.04605
4	2.00	0.02010	0.10110
5	3.00	0.05380	0.15840
6	4.00	0.08966	0.21334
7	5.00	0.11925	0.25955
8	6.00	0.13682	0.29198
9	7.00	0.13008	0.29872
10	8.00	0.12388	0.30493
11	9.00	0.11802	0.31079
12	10.00	0.11251	0.31630

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.125	0.000	0.22	0.15	0.08	0.002
0.337	0.000	0.22	0.18	0.19	0.003
0.548	0.000	0.22	0.19	0.21	0.003
0.760	0.000	0.22	0.20	0.22	0.003
0.972	0.000	0.22	0.20	0.22	0.003
1.183	0.000	0.22	0.20	0.22	0.003
1.395	0.000	0.23	0.20	0.22	0.003
1.607	0.000	0.23	0.20	0.23	0.003
1.818	0.000	0.23	0.21	0.23	0.003
2.030	0.000	0.23	0.21	0.23	0.003
2.242	0.000	0.24	0.21	0.23	0.003
2.453	0.000	0.24	0.21	0.24	0.003
2.665	0.000	0.24	0.21	0.24	0.003
2.877	0.000	0.24	0.21	0.24	0.003
3.088	0.000	0.24	0.22	0.24	0.003
3.300	0.000	0.25	0.22	0.24	0.003
3.512	0.000	0.25	0.22	0.25	0.003
3.723	0.000	0.25	0.22	0.25	0.003
3.935	0.000	0.26	0.23	0.25	0.003
4.147	0.000	0.26	0.23	0.26	0.003
4.358	0.000	0.26	0.23	0.26	0.004
4.570	0.000	0.26	0.23	0.26	0.004
4.782	0.000	0.27	0.24	0.26	0.004
4.993	0.000	0.27	0.24	0.27	0.004
5.205	0.000	0.27	0.24	0.27	0.004
5.417	0.000	0.28	0.25	0.27	0.004
5.628	0.000	0.28	0.25	0.28	0.004
5.840	0.000	0.28	0.25	0.28	0.004
6.052	0.000	0.29	0.26	0.28	0.004
6.263	0.000	0.29	0.26	0.29	0.004
6.475	0.000	0.30	0.26	0.29	0.004
6.687	0.000	0.30	0.27	0.30	0.004
6.898	0.000	0.30	0.27	0.30	0.004
7.110	0.000	0.31	0.27	0.30	0.004
7.322	0.000	0.31	0.28	0.31	0.004
7.533	0.000	0.32	0.28	0.31	0.004
7.745	0.000	0.32	0.29	0.32	0.004
7.957	0.000	0.33	0.29	0.32	0.004
8.168	0.000	0.33	0.30	0.33	0.004
8.380	0.000	0.34	0.30	0.33	0.005
8.592	0.000	0.35	0.31	0.34	0.005
8.803	0.000	0.35	0.31	0.35	0.005
9.015	0.000	0.36	0.32	0.35	0.005
9.227	0.000	0.36	0.32	0.36	0.005
9.438	0.000	0.37	0.33	0.37	0.005
9.650	0.000	0.38	0.34	0.37	0.005
9.862	0.000	0.39	0.34	0.38	0.005
10.073	0.000	0.39	0.35	0.39	0.005
10.285	0.000	0.40	0.36	0.40	0.005

10.497	0.000	0.41	0.37	0.41	0.006
10.708	0.000	0.42	0.38	0.42	0.006
10.920	0.000	0.43	0.38	0.43	0.006
11.132	0.000	0.45	0.40	0.44	0.006
11.343	0.000	0.45	0.40	0.45	0.006
11.555	0.000	0.47	0.42	0.46	0.006
11.767	0.000	0.48	0.43	0.47	0.006
11.978	0.000	0.50	0.44	0.49	0.007
12.190	0.000	0.56	0.49	0.52	0.007
12.402	0.000	0.67	0.53	0.61	0.008
12.613	0.000	0.69	0.53	0.68	0.009
12.825	0.000	0.72	0.54	0.70	0.009
13.037	0.000	0.73	0.54	0.73	0.009
13.248	0.000	0.77	0.55	0.76	0.009
13.460	0.000	0.79	0.56	0.78	0.009
13.672	0.000	0.84	0.57	0.82	0.010
13.883	0.000	0.87	0.57	0.86	0.010
14.095	0.000	0.93	0.59	0.90	0.010
14.307	0.000	0.96	0.60	0.95	0.011
14.518	0.000	1.05	0.62	1.01	0.011
14.730	0.000	1.10	0.63	1.08	0.012
14.942	0.000	1.23	0.66	1.18	0.013
15.153	0.000	1.33	0.68	1.29	0.013
15.365	0.000	1.71	0.78	1.54	0.016
15.577	0.000	1.70	0.77	1.72	0.016
15.788	0.000	2.69	1.03	2.22	0.024
16.000	0.000	4.10	1.47	3.16	0.040
16.212	0.000	13.77	4.79	5.70	0.181
16.423	0.000	1.99	2.82	6.78	0.098
16.635	0.000	1.50	1.50	4.69	0.042
16.847	0.000	1.16	0.76	2.66	0.016
17.058	0.000	1.00	0.59	1.30	0.010
17.270	0.000	0.90	0.58	0.91	0.010
17.482	0.000	0.81	0.56	0.85	0.009
17.693	0.000	0.75	0.54	0.78	0.009
17.905	0.000	0.70	0.53	0.72	0.009
18.117	0.000	0.66	0.52	0.68	0.008
18.328	0.000	0.49	0.45	0.58	0.007
18.540	0.000	0.46	0.42	0.49	0.006
18.752	0.000	0.44	0.40	0.46	0.006
18.963	0.000	0.42	0.38	0.43	0.006
19.175	0.000	0.40	0.36	0.41	0.005
19.387	0.000	0.38	0.35	0.40	0.005
19.598	0.000	0.37	0.33	0.38	0.005
19.810	0.000	0.35	0.32	0.36	0.005
20.022	0.000	0.34	0.31	0.35	0.005
20.233	0.000	0.33	0.30	0.34	0.005
20.445	0.000	0.32	0.29	0.33	0.004
20.657	0.000	0.31	0.28	0.32	0.004
20.868	0.000	0.30	0.27	0.31	0.004
21.080	0.000	0.29	0.26	0.30	0.004
21.292	0.000	0.28	0.26	0.29	0.004
21.503	0.000	0.28	0.25	0.28	0.004
21.715	0.000	0.27	0.24	0.28	0.004
21.927	0.000	0.26	0.24	0.27	0.004
22.138	0.000	0.26	0.23	0.26	0.004

22.350	0.000	0.25	0.23	0.26	0.003
22.562	0.000	0.25	0.22	0.25	0.003
22.773	0.000	0.24	0.22	0.25	0.003
22.985	0.000	0.24	0.21	0.24	0.003
23.197	0.000	0.23	0.21	0.24	0.003
23.408	0.000	0.23	0.21	0.23	0.003
23.620	0.000	0.23	0.20	0.23	0.003
23.832	0.000	0.22	0.20	0.22	0.003
24.043	0.000	0.22	0.20	0.22	0.003
24.255	0.000	0.00	0.04	0.13	0.001

B. 25-YEAR STORM

LOSS RATE AND LOW LOSS FRACTION FOR
TRACT 15591 AT NODE 7
25-YEAR STORM

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*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 4.49 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	0.68	100.00	75.	0.250	0.455
2	1.53	100.00	81.	0.200	0.566
3	0.85	40.00	56.	0.300	0.639
4	1.44	40.00	69.	0.250	0.711
5	2.33	40.00	75.	0.200	0.750

TOTAL AREA (Acres) = 6.83

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.133

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.343

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UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS
TTM 15591 FOR UPSIZING STORM DRAIN TO ACT AS DETENTION FACILITIES
25-YEAR STORM

UNIT HYDROGRAPH DEVELOPMENT

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 6.83
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.133
LOW LOSS FRACTION = 0.343
TIME OF CONCENTRATION(MIN.) = 12.65
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.87
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.94
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 4.49

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.64
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.91

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.19	0.0021	0.28 Q	.	.	.	.	
0.40	0.0070	0.28 Q	.	.	.	.	
0.61	0.0118	0.28 Q	.	.	.	.	
0.82	0.0167	0.28 Q	.	.	.	.	
1.03	0.0217	0.29 Q	.	.	.	.	
1.24	0.0266	0.29 Q	.	.	.	.	
1.45	0.0317	0.29 Q	.	.	.	.	
1.66	0.0368	0.29 Q	.	.	.	.	
1.87	0.0419	0.30 Q	.	.	.	.	
2.09	0.0471	0.30 Q	.	.	.	.	
2.30	0.0523	0.30 Q	.	.	.	.	
2.51	0.0576	0.30 Q	.	.	.	.	
2.72	0.0629	0.31 Q	.	.	.	.	
2.93	0.0683	0.31 Q	.	.	.	.	
3.14	0.0737	0.31 Q	.	.	.	.	
3.35	0.0792	0.32 Q	.	.	.	.	
3.56	0.0847	0.32 Q	.	.	.	.	
3.77	0.0903	0.32 Q	.	.	.	.	
3.98	0.0960	0.33 Q	.	.	.	.	
4.19	0.1017	0.33 Q	.	.	.	.	
4.40	0.1075	0.34 Q	.	.	.	.	
4.62	0.1134	0.34 Q	.	.	.	.	

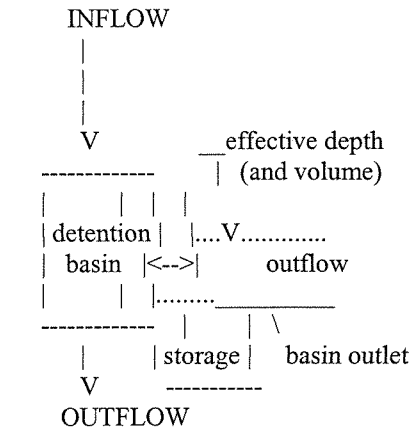
4.83	0.1193	0.34	Q	.	.	.	.
5.04	0.1253	0.35	Q	.	.	.	.
5.25	0.1314	0.35	Q	.	.	.	.
5.46	0.1375	0.35	Q	.	.	.	.
5.67	0.1438	0.36	Q	.	.	.	.
5.88	0.1501	0.36	Q	.	.	.	.
6.09	0.1565	0.37	Q	.	.	.	.
6.30	0.1629	0.37	Q	.	.	.	.
6.51	0.1695	0.38	Q	.	.	.	.
6.72	0.1762	0.38	Q	.	.	.	.
6.93	0.1829	0.39	Q	.	.	.	.
7.14	0.1898	0.39	Q	.	.	.	.
7.36	0.1967	0.40	Q	.	.	.	.
7.57	0.2038	0.41	Q	.	.	.	.
7.78	0.2109	0.42	Q	.	.	.	.
7.99	0.2182	0.42	Q	.	.	.	.
8.20	0.2256	0.43	Q	.	.	.	.
8.41	0.2331	0.43	Q	.	.	.	.
8.62	0.2408	0.44	Q	.	.	.	.
8.83	0.2486	0.45	Q	.	.	.	.
9.04	0.2565	0.46	Q	.	.	.	.
9.25	0.2646	0.47	Q	.	.	.	.
9.46	0.2729	0.48	Q	.	.	.	.
9.68	0.2813	0.49	Q	.	.	.	.
9.89	0.2899	0.50	.Q	.	.	.	.
10.10	0.2987	0.51	.Q	.	.	.	.
10.31	0.3076	0.52	.Q	.	.	.	.
10.52	0.3168	0.53	.Q	.	.	.	.
10.73	0.3262	0.55	.Q	.	.	.	.
10.94	0.3358	0.56	.Q	.	.	.	.
11.15	0.3457	0.58	.Q	.	.	.	.
11.36	0.3559	0.59	.Q	.	.	.	.
11.57	0.3663	0.61	.Q	.	.	.	.
11.78	0.3771	0.62	.Q	.	.	.	.
11.99	0.3882	0.65	.Q	.	.	.	.
12.20	0.4005	0.76	.Q	.	.	.	.
12.42	0.4150	0.91	.Q	.	.	.	.
12.63	0.4311	0.93	.Q	.	.	.	.
12.84	0.4477	0.97	.Q	.	.	.	.
13.05	0.4648	0.99	.Q	.	.	.	.
13.26	0.4825	1.04	. Q	.	.	.	.
13.47	0.5009	1.07	. Q	.	.	.	.
13.68	0.5201	1.13	. Q	.	.	.	.
13.89	0.5402	1.17	. Q	.	.	.	.
14.10	0.5611	1.24	. Q	.	.	.	.
14.31	0.5831	1.28	. Q	.	.	.	.
14.52	0.6064	1.39	. Q	.	.	.	.
14.73	0.6312	1.46	. Q	.	.	.	.
14.95	0.6584	1.66	. Q	.	.	.	.
15.16	0.6888	1.83	. Q	.	.	.	.
15.37	0.7248	2.30	. Q	.	.	.	.
15.58	0.7645	2.26	. Q	.	.	.	.
15.79	0.8147	3.51	. Q	.	.	.	.
16.00	0.8914	5.30	. Q	.	.	.	.
16.21	1.0824	16.62	.	.	.	. Q	.
16.42	1.2500	2.61	. Q	.	.	.	.

16.63	1.2904	2.04	.	Q	.	.	.
16.84	1.3215	1.54	.	Q	.	.	.
17.05	1.3465	1.33	.	Q	.	.	.
17.27	1.3686	1.21	.	Q	.	.	.
17.48	1.3887	1.10	.	Q	.	.	.
17.69	1.4071	1.02	.	Q	.	.	.
17.90	1.4243	0.95	.	Q	.	.	.
18.11	1.4404	0.90	.	Q	.	.	.
18.32	1.4537	0.64	.	Q	.	.	.
18.53	1.4645	0.60	.	Q	.	.	.
18.74	1.4746	0.57	.	Q	.	.	.
18.95	1.4843	0.54	.	Q	.	.	.
19.16	1.4934	0.51	.	Q	.	.	.
19.37	1.5022	0.49		Q	.	.	.
19.58	1.5106	0.47		Q	.	.	.
19.80	1.5187	0.46		Q	.	.	.
20.01	1.5265	0.44		Q	.	.	.
20.22	1.5341	0.42		Q	.	.	.
20.43	1.5413	0.41		Q	.	.	.
20.64	1.5484	0.40		Q	.	.	.
20.85	1.5553	0.39		Q	.	.	.
21.06	1.5619	0.38		Q	.	.	.
21.27	1.5684	0.37		Q	.	.	.
21.48	1.5747	0.36		Q	.	.	.
21.69	1.5808	0.35		Q	.	.	.
21.90	1.5868	0.34		Q	.	.	.
22.11	1.5927	0.33		Q	.	.	.
22.33	1.5984	0.33		Q	.	.	.
22.54	1.6040	0.32		Q	.	.	.
22.75	1.6095	0.31		Q	.	.	.
22.96	1.6149	0.31		Q	.	.	.
23.17	1.6202	0.30		Q	.	.	.
23.38	1.6254	0.29		Q	.	.	.
23.59	1.6304	0.29		Q	.	.	.
23.80	1.6354	0.28		Q	.	.	.
24.01	1.6403	0.28		Q	.	.	.
24.22	1.6428	0.00		Q	.	.	.

BASIN ROUTING

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 12.650
DEAD STORAGE(AF) = 0.00
SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 13

*BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS) **	**BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS) *
* 0.000	0.000	0.000**	0.500	0.008	0.560*
* 1.000	0.023	2.670**	2.000	0.061	4.630*
* 3.000	0.106	5.980**	4.000	0.152	7.070*
* 5.000	0.189	8.020**	6.000	0.214	8.870*
* 7.000	0.214	9.640**	8.000	0.214	10.350*
* 9.000	0.214	11.020**	10.000	0.214	11.650*
* 10.500	0.214	25.270**			

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.50	0.00272	0.01248
3	1.00	-0.00056	0.04596
4	2.00	0.02026	0.10094
5	3.00	0.05400	0.15820
6	4.00	0.08991	0.21309
7	5.00	0.11953	0.25927
8	6.00	0.13712	0.29168
9	7.00	0.13042	0.29839
10	8.00	0.12423	0.30457
11	9.00	0.11840	0.31041
12	10.00	0.11291	0.31590
13	10.50	-0.00575	0.43456

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.188	0.000	0.28	0.19	0.11	0.003
0.398	0.000	0.28	0.24	0.24	0.004
0.609	0.000	0.28	0.25	0.27	0.004
0.820	0.000	0.28	0.25	0.28	0.004
1.031	0.000	0.29	0.25	0.28	0.004
1.242	0.000	0.29	0.26	0.29	0.004
1.453	0.000	0.29	0.26	0.29	0.004
1.663	0.000	0.29	0.26	0.29	0.004
1.874	0.000	0.30	0.26	0.29	0.004
2.085	0.000	0.30	0.27	0.30	0.004
2.296	0.000	0.30	0.27	0.30	0.004
2.507	0.000	0.30	0.27	0.30	0.004
2.718	0.000	0.31	0.27	0.30	0.004
2.928	0.000	0.31	0.28	0.31	0.004
3.139	0.000	0.31	0.28	0.31	0.004
3.350	0.000	0.32	0.28	0.31	0.004
3.561	0.000	0.32	0.29	0.32	0.004
3.772	0.000	0.32	0.29	0.32	0.004
3.983	0.000	0.33	0.29	0.32	0.004
4.193	0.000	0.33	0.29	0.33	0.004
4.404	0.000	0.34	0.30	0.33	0.005
4.615	0.000	0.34	0.30	0.34	0.005
4.826	0.000	0.34	0.31	0.34	0.005
5.037	0.000	0.35	0.31	0.34	0.005
5.247	0.000	0.35	0.31	0.35	0.005
5.458	0.000	0.35	0.32	0.35	0.005
5.669	0.000	0.36	0.32	0.36	0.005
5.880	0.000	0.36	0.32	0.36	0.005
6.091	0.000	0.37	0.33	0.37	0.005
6.302	0.000	0.37	0.33	0.37	0.005
6.513	0.000	0.38	0.34	0.38	0.005
6.723	0.000	0.38	0.34	0.38	0.005
6.934	0.000	0.39	0.35	0.39	0.005
7.145	0.000	0.39	0.35	0.39	0.005
7.356	0.000	0.40	0.36	0.40	0.005
7.567	0.000	0.41	0.36	0.40	0.006
7.778	0.000	0.42	0.37	0.41	0.006
7.988	0.000	0.42	0.37	0.42	0.006
8.199	0.000	0.43	0.38	0.42	0.006
8.410	0.000	0.43	0.39	0.43	0.006
8.621	0.000	0.44	0.39	0.44	0.006
8.832	0.000	0.45	0.40	0.45	0.006
9.042	0.000	0.46	0.41	0.45	0.006
9.253	0.000	0.47	0.42	0.46	0.006
9.464	0.000	0.48	0.43	0.47	0.006
9.675	0.000	0.49	0.43	0.48	0.007

9.886	0.000	0.50	0.44	0.49	0.007
10.097	0.000	0.51	0.45	0.50	0.007
10.307	0.000	0.52	0.46	0.51	0.007
10.518	0.000	0.53	0.47	0.52	0.007
10.729	0.000	0.55	0.49	0.54	0.007
10.940	0.000	0.56	0.50	0.55	0.008
11.151	0.000	0.58	0.50	0.57	0.008
11.362	0.000	0.59	0.51	0.58	0.008
11.573	0.000	0.61	0.51	0.60	0.008
11.783	0.000	0.62	0.52	0.62	0.008
11.994	0.000	0.65	0.52	0.64	0.008
12.205	0.000	0.76	0.55	0.71	0.009
12.416	0.000	0.91	0.59	0.85	0.010
12.627	0.000	0.93	0.59	0.93	0.010
12.837	0.000	0.97	0.60	0.95	0.011
13.048	0.000	0.99	0.60	0.99	0.011
13.259	0.000	1.04	0.62	1.02	0.011
13.470	0.000	1.07	0.62	1.06	0.011
13.681	0.000	1.13	0.64	1.10	0.012
13.892	0.000	1.17	0.64	1.15	0.012
14.102	0.000	1.24	0.66	1.21	0.013
14.313	0.000	1.28	0.67	1.27	0.013
14.524	0.000	1.39	0.70	1.34	0.014
14.735	0.000	1.46	0.71	1.43	0.014
14.946	0.000	1.66	0.77	1.57	0.016
15.157	0.000	1.83	0.80	1.76	0.017
15.367	0.000	2.30	0.92	2.09	0.020
15.578	0.000	2.26	0.90	2.30	0.020
15.789	0.000	3.51	1.28	2.73	0.033
16.000	0.000	5.30	1.94	3.86	0.058
16.211	0.000	16.62	8.70	7.66	0.214
16.422	0.000	2.61	3.13	8.47	0.112
16.632	0.000	2.04	1.88	5.26	0.056
16.843	0.000	1.54	0.98	3.49	0.022
17.054	0.000	1.33	0.66	1.91	0.012
17.265	0.000	1.21	0.65	1.22	0.012
17.476	0.000	1.10	0.63	1.15	0.011
17.687	0.000	1.02	0.61	1.05	0.011
17.897	0.000	0.95	0.59	0.98	0.010
18.108	0.000	0.90	0.58	0.92	0.010
18.319	0.000	0.64	0.51	0.75	0.008
18.530	0.000	0.60	0.51	0.60	0.008
18.741	0.000	0.57	0.50	0.58	0.008
18.952	0.000	0.54	0.49	0.55	0.007
19.163	0.000	0.51	0.47	0.53	0.007
19.373	0.000	0.49	0.45	0.51	0.007
19.584	0.000	0.47	0.43	0.49	0.007
19.795	0.000	0.46	0.41	0.47	0.006
20.006	0.000	0.44	0.40	0.45	0.006
20.217	0.000	0.42	0.38	0.44	0.006
20.427	0.000	0.41	0.37	0.42	0.006
20.638	0.000	0.40	0.36	0.41	0.005
20.849	0.000	0.39	0.35	0.40	0.005
21.060	0.000	0.38	0.34	0.39	0.005
21.271	0.000	0.37	0.33	0.37	0.005
21.482	0.000	0.36	0.32	0.36	0.005

21.693	0.000	0.35	0.31	0.36	0.005
21.903	0.000	0.34	0.31	0.35	0.005
22.114	0.000	0.33	0.30	0.34	0.005
22.325	0.000	0.33	0.29	0.33	0.004
22.536	0.000	0.32	0.29	0.32	0.004
22.747	0.000	0.31	0.28	0.32	0.004
22.957	0.000	0.31	0.27	0.31	0.004
23.168	0.000	0.30	0.27	0.30	0.004
23.379	0.000	0.29	0.26	0.30	0.004
23.590	0.000	0.29	0.26	0.29	0.004
23.801	0.000	0.28	0.25	0.29	0.004
24.012	0.000	0.28	0.25	0.28	0.004
24.222	0.000	0.00	0.05	0.17	0.001

C. 100-YEAR STORM

LOSS RATE AND LOW LOSS FRACTION FOR
TRACT 15591 AT NODE 7
100-YEAR STORM

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*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.63 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	0.68	100.00	75.(AMC II)	0.250	0.816
2	1.53	100.00	81.(AMC II)	0.200	0.896
3	0.85	40.00	56.(AMC II)	0.300	0.792
4	1.44	40.00	69.(AMC II)	0.250	0.863
5	2.33	40.00	75.(AMC II)	0.200	0.901

TOTAL AREA (Acres) = 6.83

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.133

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.130

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UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS
TTM 15591 FOR UPSIZING STORM DRAIN TO ACT AS DETENTION FACILITIES
100-YEAR STORM

UNIT HYDROGRAPH DEVELOPMENT

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 6.83
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.133
LOW LOSS FRACTION = 0.130
TIME OF CONCENTRATION(MIN.) = 12.59
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.09
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.45
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.43
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.36
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.63

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.55
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.66

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TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.05	0.0000	0.00 Q	.	.	.	.	
0.26	0.0041	0.47 Q	.	.	.	.	
0.47	0.0123	0.47 Q	.	.	.	.	
0.68	0.0206	0.48 Q	.	.	.	.	
0.89	0.0289	0.48 Q	.	.	.	.	
1.10	0.0373	0.49 Q	.	.	.	.	
1.31	0.0458	0.49 Q	.	.	.	.	
1.52	0.0544	0.50 Q	.	.	.	.	
1.73	0.0631	0.50 Q	.	.	.	.	
1.94	0.0718	0.51 Q	.	.	.	.	
2.15	0.0806	0.51 Q	.	.	.	.	
2.36	0.0895	0.52 Q	.	.	.	.	
2.57	0.0985	0.52 Q	.	.	.	.	
2.78	0.1075	0.53 Q	.	.	.	.	
2.99	0.1167	0.53 Q	.	.	.	.	
3.20	0.1259	0.54 Q	.	.	.	.	
3.41	0.1352	0.54 Q	.	.	.	.	
3.62	0.1447	0.55 Q	.	.	.	.	
3.83	0.1542	0.55 Q	.	.	.	.	
4.04	0.1639	0.56 Q	.	.	.	.	
4.25	0.1736	0.56 Q	.	.	.	.	
4.46	0.1834	0.57 Q	.	.	.	.	
4.67	0.1934	0.58 Q	.	.	.	.	
4.88	0.2035	0.59 Q	.	.	.	.	

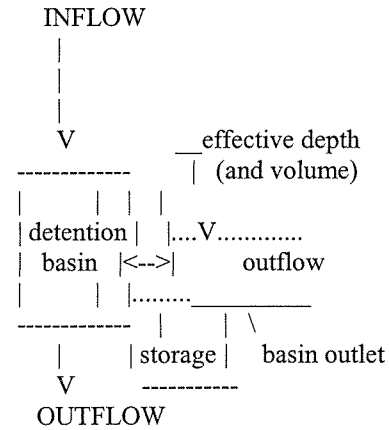
5.09	0.2137	0.59	Q	.	.	.	.
5.30	0.2240	0.60	Q	.	.	.	.
5.51	0.2344	0.60	Q	.	.	.	.
5.72	0.2450	0.61	Q	.	.	.	.
5.93	0.2557	0.62	Q	.	.	.	.
6.14	0.2666	0.63	Q	.	.	.	.
6.35	0.2776	0.64	Q	.	.	.	.
6.56	0.2887	0.65	Q	.	.	.	.
6.77	0.3000	0.65	Q	.	.	.	.
6.98	0.3114	0.67	Q	.	.	.	.
7.19	0.3230	0.67	Q	.	.	.	.
7.40	0.3348	0.69	Q	.	.	.	.
7.61	0.3468	0.69	Q	.	.	.	.
7.82	0.3589	0.71	Q	.	.	.	.
8.03	0.3713	0.72	Q	.	.	.	.
8.24	0.3838	0.73	Q	.	.	.	.
8.45	0.3966	0.74	Q	.	.	.	.
8.66	0.4096	0.76	.Q	.	.	.	.
8.87	0.4228	0.77	.Q	.	.	.	.
9.08	0.4362	0.78	.Q	.	.	.	.
9.29	0.4499	0.79	.Q	.	.	.	.
9.50	0.4639	0.82	.Q	.	.	.	.
9.70	0.4781	0.83	.Q	.	.	.	.
9.91	0.4926	0.85	.Q	.	.	.	.
10.12	0.5075	0.86	.Q	.	.	.	.
10.33	0.5226	0.89	.Q	.	.	.	.
10.54	0.5381	0.90	.Q	.	.	.	.
10.75	0.5540	0.93	.Q	.	.	.	.
10.96	0.5703	0.95	.Q	.	.	.	.
11.17	0.5870	0.98	.Q	.	.	.	.
11.38	0.6041	1.00	.Q	.	.	.	.
11.59	0.6217	1.03	.Q	.	.	.	.
11.80	0.6398	1.06	.Q	.	.	.	.
12.01	0.6585	1.10	.Q	.	.	.	.
12.22	0.6793	1.29	.Q	.	.	.	.
12.43	0.7032	1.47	.Q	.	.	.	.
12.64	0.7289	1.50	.Q	.	.	.	.
12.85	0.7554	1.56	. Q	.	.	.	.
13.06	0.7828	1.60	. Q	.	.	.	.
13.27	0.8113	1.68	. Q	.	.	.	.
13.48	0.8408	1.73	. Q	.	.	.	.
13.69	0.8717	1.83	. Q	.	.	.	.
13.90	0.9039	1.89	. Q	.	.	.	.
14.11	0.9378	2.02	. Q	.	.	.	.
14.32	0.9737	2.11	. Q	.	.	.	.
14.53	1.0119	2.30	. Q	.	.	.	.
14.74	1.0527	2.41	. Q	.	.	.	.
14.95	1.0970	2.70	. Q	.	.	.	.
15.16	1.1454	2.88	. Q	.	.	.	.
15.37	1.1999	3.40	. Q	.	.	.	.
15.58	1.2592	3.43	. Q	.	.	.	.
15.79	1.3299	4.73	. Q	.	.	.	.
16.00	1.4283	6.61	. Q	.	.	.	.
16.21	1.6730	21.61	.	.	.	Q	.	.
16.42	1.8939	3.86	. Q	.	.	.	.
16.63	1.9543	3.11	. Q	.	.	.	.

16.84	2.0034	2.54	. Q	.	.	.	.
17.05	2.0445	2.20	. Q	.	.	.	.
17.26	2.0805	1.95	. Q	.	.	.	.
17.47	2.1128	1.78	. Q	.	.	.	.
17.68	2.1424	1.64	. Q	.	.	.	.
17.89	2.1698	1.53	. Q	.	.	.	.
18.10	2.1956	1.44	.Q	.	.	.	.
18.31	2.2174	1.08	.Q	.	.	.	.
18.52	2.2355	1.02	.Q	.	.	.	.
18.73	2.2526	0.96	.Q	.	.	.	.
18.94	2.2689	0.92	.Q	.	.	.	.
19.15	2.2844	0.87	.Q	.	.	.	.
19.36	2.2993	0.84	.Q	.	.	.	.
19.57	2.3135	0.80	.Q	.	.	.	.
19.78	2.3272	0.78	.Q	.	.	.	.
19.99	2.3404	0.75	Q	.	.	.	.
20.20	2.3532	0.72	Q	.	.	.	.
20.41	2.3655	0.70	Q	.	.	.	.
20.62	2.3775	0.68	Q	.	.	.	.
20.83	2.3891	0.66	Q	.	.	.	.
21.04	2.4004	0.64	Q	.	.	.	.
21.25	2.4114	0.63	Q	.	.	.	.
21.46	2.4221	0.61	Q	.	.	.	.
21.67	2.4325	0.59	Q	.	.	.	.
21.88	2.4427	0.58	Q	.	.	.	.
22.09	2.4527	0.57	Q	.	.	.	.
22.30	2.4625	0.56	Q	.	.	.	.
22.50	2.4720	0.54	Q	.	.	.	.
22.71	2.4813	0.53	Q	.	.	.	.
22.92	2.4905	0.52	Q	.	.	.	.
23.13	2.4995	0.51	Q	.	.	.	.
23.34	2.5083	0.50	Q	.	.	.	.
23.55	2.5169	0.49	Q	.	.	.	.
23.76	2.5254	0.49	Q	.	.	.	.
23.97	2.5338	0.48	Q	.	.	.	.
24.18	2.5420	0.47	Q	.	.	.	.
24.39	2.5460	0.00	Q	.	.	.	.

BASIN ROUTING

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 12.590
DEAD STORAGE(AF) = 0.00
SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 13

*BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS) **	**BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS) *
* 0.000	0.000	0.000**	0.500	0.008	0.560*
* 1.000	0.023	2.670**	2.000	0.061	4.630*
* 3.000	0.106	5.980**	4.000	0.152	7.070*
* 5.000	0.189	8.020**	6.000	0.214	8.870*
* 7.000	0.214	9.640**	8.000	0.214	10.350*
* 9.000	0.214	11.020**	10.000	0.214	11.650*
* 10.500	0.214	25.270**			

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.50	0.00274	0.01246
3	1.00	-0.00045	0.04585
4	2.00	0.02045	0.10075
5	3.00	0.05425	0.15795
6	4.00	0.09020	0.21280
7	5.00	0.11986	0.25894
8	6.00	0.13749	0.29131
9	7.00	0.13081	0.29799
10	8.00	0.12466	0.30414
11	9.00	0.11885	0.30996
12	10.00	0.11339	0.31542

13 10.50 -0.00471 0.43352

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.053	0.000	0.00	0.00	0.00	0.000
0.262	0.000	0.47	0.33	0.18	0.005
0.472	0.000	0.47	0.40	0.41	0.006
0.682	0.000	0.48	0.42	0.46	0.006
0.892	0.000	0.48	0.43	0.48	0.007
1.102	0.000	0.49	0.43	0.48	0.007
1.312	0.000	0.49	0.44	0.49	0.007
1.521	0.000	0.50	0.44	0.49	0.007
1.731	0.000	0.50	0.45	0.50	0.007
1.941	0.000	0.51	0.45	0.50	0.007
2.151	0.000	0.51	0.45	0.51	0.007
2.361	0.000	0.52	0.46	0.51	0.007
2.571	0.000	0.52	0.46	0.52	0.007
2.780	0.000	0.53	0.47	0.52	0.007
2.990	0.000	0.53	0.47	0.53	0.007
3.200	0.000	0.54	0.48	0.53	0.007
3.410	0.000	0.54	0.48	0.54	0.007
3.620	0.000	0.55	0.49	0.54	0.007
3.830	0.000	0.55	0.49	0.55	0.007
4.039	0.000	0.56	0.50	0.55	0.008
4.249	0.000	0.56	0.50	0.56	0.008
4.459	0.000	0.57	0.50	0.57	0.008
4.669	0.000	0.58	0.50	0.58	0.008
4.879	0.000	0.59	0.51	0.58	0.008
5.089	0.000	0.59	0.51	0.59	0.008
5.299	0.000	0.60	0.51	0.60	0.008
5.508	0.000	0.60	0.51	0.60	0.008
5.718	0.000	0.61	0.51	0.61	0.008
5.928	0.000	0.62	0.51	0.62	0.008
6.138	0.000	0.63	0.52	0.63	0.008
6.348	0.000	0.64	0.52	0.63	0.008
6.557	0.000	0.65	0.52	0.64	0.008
6.767	0.000	0.65	0.52	0.65	0.008
6.977	0.000	0.67	0.53	0.66	0.008
7.187	0.000	0.67	0.53	0.67	0.008
7.397	0.000	0.69	0.53	0.68	0.009
7.607	0.000	0.69	0.53	0.69	0.009
7.816	0.000	0.71	0.54	0.70	0.009
8.026	0.000	0.72	0.54	0.71	0.009
8.236	0.000	0.73	0.54	0.72	0.009
8.446	0.000	0.74	0.54	0.74	0.009
8.656	0.000	0.76	0.55	0.75	0.009
8.866	0.000	0.77	0.55	0.76	0.009
9.075	0.000	0.78	0.55	0.78	0.009
9.285	0.000	0.79	0.56	0.79	0.009

9.495	0.000	0.82	0.56	0.81	0.009
9.705	0.000	0.83	0.56	0.82	0.010
9.915	0.000	0.85	0.57	0.84	0.010
10.125	0.000	0.86	0.57	0.86	0.010
10.335	0.000	0.89	0.58	0.88	0.010
10.544	0.000	0.90	0.58	0.90	0.010
10.754	0.000	0.93	0.59	0.92	0.010
10.964	0.000	0.95	0.59	0.94	0.010
11.174	0.000	0.98	0.60	0.96	0.011
11.384	0.000	1.00	0.60	0.99	0.011
11.594	0.000	1.03	0.61	1.02	0.011
11.803	0.000	1.06	0.62	1.05	0.011
12.013	0.000	1.10	0.63	1.08	0.011
12.223	0.000	1.29	0.68	1.21	0.013
12.433	0.000	1.47	0.72	1.40	0.014
12.643	0.000	1.50	0.72	1.49	0.014
12.852	0.000	1.56	0.74	1.53	0.015
13.062	0.000	1.60	0.75	1.59	0.015
13.272	0.000	1.68	0.77	1.65	0.016
13.482	0.000	1.73	0.78	1.71	0.016
13.692	0.000	1.83	0.80	1.78	0.017
13.902	0.000	1.89	0.82	1.86	0.017
14.111	0.000	2.02	0.85	1.96	0.018
14.321	0.000	2.11	0.87	2.08	0.019
14.531	0.000	2.30	0.92	2.22	0.020
14.741	0.000	2.41	0.94	2.37	0.021
14.951	0.000	2.70	1.02	2.56	0.023
15.161	0.000	2.88	1.08	2.76	0.026
15.370	0.000	3.40	1.26	3.00	0.033
15.580	0.000	3.43	1.34	3.26	0.036
15.790	0.000	4.73	1.78	3.77	0.052
16.000	0.000	6.61	2.52	4.77	0.084
16.210	0.000	21.61	10.41	14.11	0.214
16.420	0.000	3.86	1.68	13.44	0.048
16.629	0.000	3.11	1.40	3.72	0.038
16.839	0.000	2.54	1.11	3.17	0.027
17.049	0.000	2.20	0.91	2.59	0.020
17.259	0.000	1.95	0.82	2.11	0.017
17.469	0.000	1.78	0.78	1.84	0.016
17.679	0.000	1.64	0.75	1.69	0.015
17.889	0.000	1.53	0.73	1.57	0.014
18.098	0.000	1.44	0.71	1.47	0.014
18.308	0.000	1.08	0.61	1.24	0.011
18.518	0.000	1.02	0.61	1.03	0.011
18.728	0.000	0.96	0.59	0.98	0.010
18.938	0.000	0.92	0.58	0.93	0.010
19.147	0.000	0.87	0.57	0.89	0.010
19.357	0.000	0.84	0.57	0.85	0.010
19.567	0.000	0.80	0.56	0.82	0.009
19.777	0.000	0.78	0.55	0.79	0.009
19.987	0.000	0.75	0.54	0.76	0.009
20.197	0.000	0.72	0.54	0.73	0.009
20.406	0.000	0.70	0.53	0.71	0.009
20.616	0.000	0.68	0.53	0.69	0.008
20.826	0.000	0.66	0.52	0.67	0.008
21.036	0.000	0.64	0.52	0.65	0.008

21.246	0.000	0.63	0.52	0.63	0.008
21.456	0.000	0.61	0.51	0.62	0.008
21.666	0.000	0.59	0.51	0.60	0.008
21.875	0.000	0.58	0.50	0.59	0.008
22.085	0.000	0.57	0.50	0.57	0.008
22.295	0.000	0.56	0.50	0.56	0.008
22.505	0.000	0.54	0.49	0.55	0.007
22.715	0.000	0.53	0.48	0.54	0.007
22.924	0.000	0.52	0.47	0.53	0.007
23.134	0.000	0.51	0.46	0.52	0.007
23.344	0.000	0.50	0.45	0.51	0.007
23.554	0.000	0.49	0.44	0.50	0.007
23.764	0.000	0.49	0.44	0.49	0.007
23.974	0.000	0.48	0.43	0.48	0.007
24.184	0.000	0.47	0.42	0.48	0.006
24.393	0.000	0.00	0.09	0.29	0.001

SECTION 5

REFERENCES

A. TRACT 10931 STORM DRAIN IMPROVEMENT PLANS

IMPROVEMENT PLANS
FOR
SERRANO HIGHLANDS
TRACT NO. 10931 & 12304
(PORTION OF TENT. TRACT NO. 10931)

...ELOPER SHALL MEAN THE SUBDIVISION DEVELOPER, PERMITTEE, OR SHALL MEAN CONTRACTOR IN THE CASE OF A PUBLIC WORKS CONTRACT WITH THE COUNTY OF ORANGE. ...OFFICIAL SHALL MEAN THE DIRECTOR, EMA, OR HIS AUTHORIZED AGENT. ...ACTING WITHIN THE SCOPE OF HIS AUTHORITY.

THE DEVELOPER SHALL OBTAIN AN ENCROACHMENT PERMIT FROM EMA, REGULATION, PRIOR TO INSTALLATION OF STREET IMPROVEMENTS, UTILITIES, OR OTHER WORK WITHIN THAT SHOWN ON PLANS APPROVED BY EMA, DEVELOPMENT. TELEPHONE E.M. DEVELOPMENT AT (714) 834-3485.

THE DEVELOPER SHALL TELEPHONE EMA, DEVELOPMENT AT LEAST 24 HOURS PRIOR TO STARTING CONSTRUCTION WORK SUBJECT TO EMA, DEVELOPMENT INSPECTION. THE DEVELOPER SHALL TELEPHONE EMA, REGULATION AT LEAST 48 HOURS PRIOR TO STARTING GRADING OR BRUSHING WORK SUBJECT TO A GRADING PERMIT.

ALL UNDERGROUND UTILITIES SHALL BE INSTALLED PRIOR TO SURFACING OF STREETS. THE INSTALLATION OF ALL UNDERGROUND FACILITIES CROSSING EXISTING ARTERIAL HIGHWAYS REQUIRES BORING OR JACKING, UNLESS OTHERWISE APPROVED BY THE ASSISTANT DIRECTOR, EMA DEVELOPMENT.

MANHOLES SHALL BE INSTALLED IN LOCATIONS APPROVED BY THE LOCAL POSTMASTER UNLESS OTHERWISE EMA STANDARD PLANS.

CORRESPONDING STATE OF CALIFORNIA TEST METHODS MAY BE SUBSTITUTED FOR ALL ASTM TEST METHODS FOR WORK SUBJECT TO EMA, DEVELOPMENT INSPECTION, EXCEPT AS NOTED IN NO. 8.

LABORATORY MAXIMUM DENSITY TEST FOR WORK SUBJECT TO EMA, DEVELOPMENT INSPECTION SHALL BE PER METHOD 2 OF SECTION 211-2.1. THE CORRECTION FOR COARSE MATERIAL AS STATED IN TEST METHOD NO. CALIFORNIA 216 SHALL BE REPLACED WITH NOTE 2 OF ASTM D1557. LABORATORY MAXIMUM DENSITY TESTS FOR WORK UNDER A GRADING PERMIT SHALL CONFORM TO THE REQUIREMENTS OF THE GRADING AND EXCAVATION CODE.

THE FUNCTIONAL SECTION REQUIREMENTS FOR PRIVATE AND PUBLIC ROADS CREATED BY A TENTATIVE TRACT MAP OR PARCEL MAP SHALL BE DETERMINED BY EMA'S MATERIALS ENGINEER. SUBGRADE COMPACTION REQUIREMENTS RECOMMENDED BY THE PROJECT SOILS ENGINEER MAY BE MODIFIED BY THE EMA'S MATERIAL ENGINEER WHEN NECESSARY FOR STRUCTURAL SECTION DESIGN. STRUCTURAL SECTION REQUIREMENTS FOR COMMERCIAL OR INDUSTRIAL DRIVEWAYS AND PARKING AREAS SUBJECT TO THE INSPECTION OF EMA REGULATION SHALL BE APPROVED IN ACCORDANCE WITH THE REQUIREMENTS OF THE GRADING AND EXCAVATION CODE.

ALL DRIVEWAY DEPRESSIONS ARE MADE IN ANY CURB. DRIVEWAY APPROACHES ARE NOT THEN CONSIDERED TO BE PART OF THE IMPROVEMENT PLAN AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH EMA STANDARD PLANS.

MONUMENTS ARE TO BE SET PER THE REQUIREMENTS OF THE SUBDIVISION MAP ACT, LAND SURVEYORS ACT, AND COUNTY SUBDIVISION CODE AND IN ACCORDANCE WITH THE RULES AND PROCEDURES APPROVED BY THE COUNTY SURVEYOR. ALL LOT CORNERS AND TRACT BOUNDARIES SHALL BE LOCATED AND MONUMENTED IN ACCORDANCE WITH THE RECORDED TRACT MAP AND A WRITTEN CONFIRMATION TO THAT EFFECT SHALL BE SUBMITTED TO THE BUILDING OFFICIAL BY THE PROJECT CIVIL ENGINEER. IN CASES WHERE BUILDINGS OR STRUCTURES ARE BUILT UPON PROPERTY LINES, AND MARKERS NEED NOT BE SET. THE PROJECT CIVIL ENGINEER SHALL PROVIDE WRITTEN EVIDENCE TO THE BUILDING OFFICIAL THAT THE BUILDINGS ARE LOCATED IN COMPLIANCE WITH THE APPROVED PLOT PLAN.

TREES SHALL NOT BE PLANTED IN ORANGE COUNTY RIGHT OF WAY UNLESS A PERMIT HAS BEEN OBTAINED FROM EMA, REGULATION, OR ARE PLANTED IN ACCORDANCE WITH A LANDSCAPE PLAN APPROVED BY THE ASSISTANT DIRECTOR, DEVELOPMENT. SEE STANDARD PLAN 117 FOR LOCATION RESTRICTIONS AT INTERSECTIONS.

ADVERTISING SIGNS WILL NOT BE PERMITTED WITHIN STREET RIGHT OF WAY PER ORANGE COUNTY CODIFIED ORDINANCE 6-1-69.

JOINTS BETWEEN NEW PAVEMENT AND EXISTING PAVEMENT SHALL BE MADE BY SAW CUTTING EXISTING PAVEMENT TO EFFECT A NEAT JOIN OR BY FEATHERING NEW ASPHALT CONCRETE OVER EXISTING. ALL AS DIRECTED BY THE ENGINEER.

DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF COUNTY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE DRY SWEEPING OF ALL PAVED AREA.

PRIOR TO FINAL ACCEPTANCE OF STREET IMPROVEMENTS, ALL STREET STRIPING AND STENCILING WITHIN THE PERIMETER OF THE CONSTRUCTION PROJECT WILL BE RESTORED TO A "LIKE NEW" CONDITION IN A MANNER MEETING THE APPROVAL OF THE ASSISTANT DIRECTOR, EMA/DEVELOPMENT.

ALL CONCRETE SIDEWALKS OR CURBS SHALL BE SAW-CUT TO THE NEAREST TRANSVERSE SCORE MARK OR ADJUSTABLE CONTROL JOINT OR WEAKENED PLANE JOINT WHERE REQUIRED TO CONFORM WITH THE APPLICABLE PROVISIONS OF THE ORANGE COUNTY STANDARD PLANS AND STANDARD SPECIFICATIONS.

SEWER NOTES

1. ALL SANITARY SEWER WORK SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF SEWERS" OF THE LOS ALISOS WATER DISTRICT. THE CONTRACTOR SHALL KEEP A COPY OF THE STANDARD SPECIFICATIONS AND DRAWINGS ON THE JOB SITE AT ALL TIMES
2. FOUR COPIES OF APPROVED CONSTRUCTION PLANS SHALL BE FURNISHED TO THE DISTRICT ENGINEER'S OFFICE PRIOR TO BEGINNING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO ANY INSPECTION CALL (714) 830-0580
4. FOUR-INCH, INTERNAL DIAMETER, VCP HOUSE CONNECTIONS ARE TO BE CONSTRUCTED FROM THE SEWER MAIN LINE TO THE PROPERTY LINE FOR EACH LOT OR AS SHOWN ON THE PLANS
5. ALL SEWER MAINS, HOUSE CONNECTIONS, AND APPURTENANCES SHALL BE CONSTRUCTED PRIOR TO PAVING OF THE STREET.
6. SEWER LENGTHS ARE CALCULATED ON HORIZONTAL DISTANCES
7. VCP STUBS AND THE FIRST TWO JOINTS OUT OF ALL MANHOLES SHALL BE ONE FOOT MAXIMUM MEASURED FROM THE INSIDE WALL OF THE MANHOLE
8. THE SURVEYOR SHALL STAKE THE LOCATION OF ALL WYE FITTINGS ALL HOUSE LATERALS NOT NORMAL TO STREET SEWERS SHALL HAVE END OF LATERAL AT PROPERTY LINE STAKED AND TIED TO A PROPERTY LINE AS SHOWN ON THE PLANS
9. IT SHALL BE THE RESPONSIBILITY OF THE SEWER CONTRACTOR TO EXPOSE ALL JOINT POINTS TO EXISTING LINES AND TO HAVE THE LOCATION AND ELEVATION VERIFIED BY THE DISTRICT ENGINEER PRIOR TO ANY SEWER STAKES BEING FURNISHED
10. THE LOS ALISOS WATER DISTRICT WILL INSPECT ALL MAIN LINE SEWERS THE ORANGE COUNTY BUILDING AND SAFETY DEPARTMENT WILL INSPECT AND CERTIFY ALL HOUSE LATERALS A MINIMUM OF 10 FEET 4 INCHES OF HOUSE LATERAL SHALL BE INSTALLED AND INSPECTED BY THE ORANGE COUNTY BUILDING AND SAFETY DEPARTMENT AND TESTED JOINTLY WITH THE MAIN LINE UNDER THE JURISDICTION OF THE LOS ALISOS WATER DISTRICT
11. IN ORDER TO PREVENT ACCIDENTAL USE OF THE NEW SEWER PRIOR TO COMPLETION AND ACCEPTANCE, THE INLET OF THE DOWNSTREAM EXISTING MANHOLE SHOULD BE PLUGGED WITH BRICK AND MORTAR
12. NO FACILITY SHALL BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT
13. SEWER MAIN OWNERSHIP - UPON COMPLETION OF ALL TESTS AND ACCEPTANCE BY THE DEVELOPER, OPERATION AND MAINTENANCE SHALL BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT
14. SEWER LATERAL OWNERSHIP - UPON COMPLETION OF ALL TESTS AND ACCEPTANCE BY THE ORANGE COUNTY BUILDING DEPARTMENT, OPERATION AND MAINTENANCE SHALL NOT BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT
15. PROVIDE A CLEANOUT TUB OUTSIDE OF THE HOUSE OR GARAGE AND IDENTIFY WITH A LANDMARK TO FACILITATE SEWER HOUSE LATERALS AND MAIN LINE CLEANING.
16. ALL SEWER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "S" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
17. THE SEWER IMPROVEMENTS AND SEWER SYSTEM OPERATIONS ARE APPROVED, SUBJECT TO FUTURE SEWER DISCHARGES CONFORMING TO THE LOS ALISOS WATER DISTRICT "RULES AND REGULATIONS FOR SEWER CONSTRUCTION, SEWER USE AND INDUSTRIAL WASTE WATER DISCHARGES AND FUTURE REVISIONS."
18. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OF PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
19. A SET OF "AS-CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS

WATER NOTES

1. THE WATER SYSTEM SHALL CONFORM TO THE LOS ALISOS WATER DISTRICT'S "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEM" AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CALL 714-830-0580.
4. WATER MAINS SHALL BE INSTALLED 6-FEET OFF THE CURB FACE, UNLESS OTHERWISE INDICATED, AND PRIOR TO PAVING OF THE STREETS.
5. FIRE HYDRANTS AND BLOWOFFS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROPRIATE DETAILS HEREIN AND INSTALLED BEHIND CURBS AND SIDEWALKS WHERE THE SIDEWALKS ARE ADJACENT TO CURBS.
6. METER SERVICES SHALL BE SIZED BY THE LOS ALISOS WATER DISTRICT.
7. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
8. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E C 244 MANUFACTURED BY MINNESOTA MINING AND MANUFACTURING AFTER INSTALLATION INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C105.
9. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT
10. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT.
11. ALL HOUSE SERVICES BELOW THE FOLLOWING WATER ZONE ELEVATIONS SHALL BE FURNISHED WITH A PRESSURE REDUCING VALVE SET AT A MAXIMUM PRESSURE OF 80 PSI

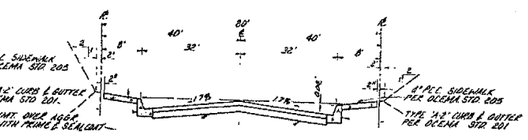
DISTRICT WATER ZONE	PRV REQUIRED BELOW ELEVATION
I	435
II	690
III	765

12. ALL WATER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "W" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
13. WATER METERS LOCATED IN DRIVEWAY AREAS WILL NOT BE ACCEPTED. THE DEVELOPER SHALL RELOCATE SUCH METERS TO A LOCATION ACCEPTABLE TO THE DISTRICT INSPECTOR.
14. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OF PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY
15. A SET OF "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS

RECLAIMED WATER NOTES

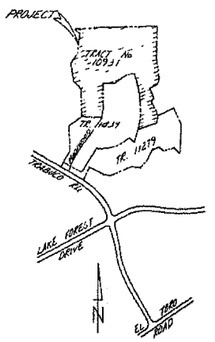
1. THE RECLAIMED WATER SYSTEM SHALL CONFORM TO ALL THE LOS ALISOS WATER DISTRICT STANDARD SPECIFICATIONS FOR RECLAIMED WATER SYSTEM AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHAL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION CALL (714) 830-0580
4. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM TO BE ACCEPTED BY THE DISTRICT OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
5. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E C 244 MANUFACTURED BY MINNESOTA MINING AND MANUFACTURING AFTER INSTALLATION INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C105
6. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT
7. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT
8. A SET OF MYLAR "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

PALMWOOD
TAMARISK



PEACHWOOD

STREET	STATION	LIMITS TO STATION	* STRUCTURAL SECTION
PEACHWOOD			
PALMWOOD			
TAMARISK			



LOCATION MAP
N.T.S.

ESTIMATE OF QUANTITIES

No.	STREET CONSTRUCTION	QUANTITY		
1	CONST. A.C. HYDROCOAT AND A.R. MIX PRIME COAT	204,320	S.F.	
2	CONST. 6" CONC. CURB & GUTTER TYPE 'A' PER OCEMA STD PLAN 201	4,947	L.F.	
3	CONST. 8" CONC. CURB & GUTTER TYPE 'A-8' PER OCEMA STD PLAN 201	6,814	L.F.	
4	CONST. 4" THICK CONC. SIDEWALK PER OCEMA STD. PLAN 205	47,084	S.F.	
5	CONST. STREET LAMP (10,000 LUMEN - HPS.) (8000 LUMEN - 17 HPS.)	24	EA.	
6	REMOVE EXISTING DAMAGED IMPROVEMENTS	134	L.F.	
7	CONST. SIDEWALK RETURN & ACCESS RAMP PER OCEMA STD. 111	11	EA.	
8	CONST. LOCAL DEPRESSION PER OCEMA STD 302	7	EA.	
9	INSTALL STREET NAME SIGN	4	EA.	
10	CONST. CONC. CROSS GUTTER PER OCEMA. STD. PLAN 208	4,934	S.F.	
11	REMOVE TEMP. BARRICADE-TYPE III, PER OCEMA STD. 604	89	L.F.	
12	INSTALL STOP SIGN	3	EA.	
13	INSTALL W-13 (UNT ATTENUM STREAM) SIGN	1	EA.	
14	CONST. 6" TO 8" C.P. CURB TRANSITION	218	L.F.	
15	CITHOUT GRINDING & STRIPING	1	LS.	
16	CONST. 6" A.C. DIKE PER O.C.E.M.A. STD. 201	-	L.F.	
17	CONST. CONC. CROSS GUTTER PER OCEMA STD PLAN 207	3,580	S.F.	
18	CONST PARKWAY CULVERT PER O.C.E.M.A STD 309	1	EA.	
19	CONST OUTLET PIPE PER DETAIL SHT. 4	1	EA.	
20	6" CONC. CURB	340	L.F.	
	STRIPING			
	STRIPE 4" DOUBLE YELLOW LINE	1085	LF	
	STRIPE 4" DASH CURB "I" STRIPE - 17'GAP - WHITE	2666	LF	
	12" SOLID WHITE LIMIT LINE "STOP LEGEND	2	EA	
	STRIPE 8" SOLID WHITE LINE	270	LF	
	STENCIL PAVEMENT ARROW	3	EA	
21	4' WIDE ALLEY GUTTER	152	LF	
22	CONST 7" STAMPED CONC. OR BRICK PAVERS	378	SF	
	SEWER CONSTRUCTION			
30	CONST. STD MANHOLE 48" I.D. PER L.A.W.D. STD PLAN S-1	15	EA	
31	CONST 8" V.C.P. SEWER PER LA.W.D. STD PLANS & SPECS.	4,351	L.F.	
32	REMOVE EXISTING VCP STOPPER & JOIN	3	EA.	
33	INSTALL 8" V.C.P. STOPPER	9	EA.	
34	CONST. CONC. ENCASEMENT PER L.A.W.D. STD. PLANS & SPECS.	10	L.F.	
35	CONST. STD. MANHOLE 60" I.D. PER L.A.W.D. STD. PLAN S-1	2	EA.	
36	CONST. 4" VCP LATERAL PER L.A.W.D STD'S.		L.F.	
	WATER CONSTRUCTION			
40	INSTALL 8" C-900 WATERMAIN (CL 150) PER L.A.W.D. STD. PLANS & SPECS	1942	L.F.	
41	INSTALL 8" C.A.P. WATERMAIN (CL 150) PER L.A.W.D. STD. PLANS & SPECS	2080	L.F.	
42	INSTALL 12" BUTTERFLY VALVE PER L.A.W.D. STD. W-6	8	EA.	
43	INSTALL 10" BUTTERFLY VALVE PER L.A.W.D. STD. W-6	8	EA.	
44	INSTALL 8" C.A.P. WATERMAIN (CL 150) PER L.A.W.D. STD. PLANS & SPECS.	200	L.F.	
45	INSTALL 8" BUTTERFLY VALVE PER L.A.W.D. STD. W-6	14	EA.	
46	INSTALL 12" BUTTERFLY VALVE PER L.A.W.D. STD. W-7B	1	EA.	
47	INSTALL FLUS PER L.A.W.D. STD. PLANS & SPECS.	26	EA.	
48	REMOVE PLUG & JOIN EXIST. 6" C.I.P. MAIN	2	EA.	
49	INSTALL 3/4" WATER SERVICE PER L.A.W.D. STD. W-1 & W-3	1	EA.	
50	INSTALL BLOWOFF ASSEMBLY PER L.A.W.D. STD. W-7B	1	EA.	
51	INSTALL 8" C.A.P. WATERMAIN (CL. 200) PER L.A.W.D. STD. PLANS & SPECS	616	L.F.	
52	INSTALL FIRE HYDROBILT ASSEMBLY PER L.A.W.D. STD. W-5	10	EA.	
53	INSTALL 4" AWWA C900 PVC CL150 PER L.A.W.D. STD. PLANS SPECS	3056	L.F.	
54	INSTALL 4" BUTTERFLY VALVE PER L.A.W.D. STDS. W.G.R.S	12	EA.	
55	INSTALL 2" IRRIGATION METER	1	EA	
56	INSTALL 6" AWWA C900 PVC CL150 PER L.A.W.D. STD. PLANS & SPECS.	930	L.F.	

QUANTITIES CONT.

No.	STORM DRAIN CONSTRUCTION	QUANTITY	
60	REMOVE EXISTING RISER	1	EA.
61	CONST. INLET TYPE 'B' PER OCEMA STD 302.	3	EA.
62	CONST. JB TYPE 'I' MANHOLE PER OCEMA STD. 310	2	EA.
63	CONST. JB TYPE 'I' NO MANHOLE PER OCEMA STD 310	1	EA.
64	CONST. JB TYPE III PER OCEMA STD. 312		
65	CONST. REINFORCED CONCRETE COLLAR PER STD 317.	2	EA.
66	INSTALL 33" R.C.P. - 1750 D	342	L.F.
67	INSTALL 30" R.C.P. - 1750 D	128	L.F.
	INSTALL 30" R.C.P. - 2000 D	317	L.F.
68	INSTALL 18" R.C.P. - 1750 D	68	L.F.
	INSTALL 18" R.C.P. - 2000 D	412	L.F.
69	CONST. TEMPORARY INLET PER DETAILS SHT. 8	1	EA.
70	CONST. REINFORCED CONCRETE INLET PER STT. 7	1	EA.

1A	ADDED INFO. ON INTERSECTION	A.L.C.	7/11/83
1B	ADDED PRIVATE STREET IMPROVEMENTS	S.	7/21/83
1C	ADDED TR. 11279 ADDED CURB MARKING SPS. (10-10-17)	S.	7/21/83
No.	REVISION	BY	DATE

REVISION (CONT.)

DESIGN BY: DPH - 10/15/82
DRAWN BY: DPH - 10/13/82
CHECKED BY: DLS - 12/6/82

UTILITY APPROVAL AND REVISIONS

FOR RECLAIMED WATER IMPROVEMENTS:
LOS ALISOS WATER DISTRICT
Phillip M. Miller 2-23-83
R.C.E. DATE

FOR SEWER IMPROVEMENTS:
LOS ALISOS WATER DISTRICT
Phillip M. Miller 2-23-83
R.C.E. DATE

FOR WATER IMPROVEMENTS
LOS ALISOS WATER DISTRICT
Phillip M. Miller 2-23-83
R.C.E. DATE

FOR RECLAIMED WATER OPERATIONS:
LOS ALISOS WATER DISTRICT
E.T. Mc Sturdivant 2-23-83
GENERAL MANAGER DATE

FOR SEWER SYSTEM OPERATION
LOS ALISOS WATER DISTRICT
E.T. Mc Sturdivant 2-23-83
GENERAL MANAGER DATE

FOR WATER SYSTEM OPERATION
LOS ALISOS WATER DISTRICT
E.T. Mc Sturdivant 2-23-83
GENERAL MANAGER DATE

REVISION:	DATE	APP'D
ADD RECLAIMED WATER NOTES, REVISED, NO NOTE NO. ON LIST OF S.S., ADJUSTED ELEVATION OF SHT. 5	4/6/83	
ADDED SEWER MANHOLE NO. 3 ON SHT. 5	4/6/83	
REVISED TRACT TITLE	10-19-83	
ADD. VERT. ALIGN & NOTES	11-2-83	
MOVED 8" W. LATERAL AT LOT 10	11-3-83	
ADD. 8" RECLAIMED WATER	11-4-83	
REVISED TR. 10931 TO TR. 11279	11-4-83	
REVISED TR. 10931 TO TR. 11279	11-4-83	

REVISION:	DATE	APP'D
ADD 8" W. LATERAL TO ANNEX BLOW OFF W.B.A. # 5	11-16-83	
MOVED TR. 11279 SHT. 4	11-21-83	
REVISED TR. 11279 SHT. 5	11-21-83	
REVISED TR. 11279 SHT. 6	11-21-83	
REVISED TR. 11279 SHT. 7	11-21-83	
ADDED 8" W. LATERAL, R.P.V. & BLOW OFF ASSEMBLY	11-21-83	
REVISED TR. 11279 SHT. 8	11-21-83	
ADDED WATER LINE TO EXIST. W. LINE ON N/A SHT. 6	3-15-84	

REVISIONS

No.	DESCRIPTION	SHT.	APPROVED	DATE
6A	ADDED NOTE RETAINING PER TR. 10931 LOT 19	4, 8		
6B	REVISED TR. 10931 TO TR. 11279 LOT 19	4		
7	REVISED NOTE NO. 16 & ADD'L DIA. SEW. TO ALIGNMENT & CURB MK.	5		12-13-83
7A	ADDED CURB RETURNS PER TR. 11279 LOT 12-3	6		"
7B	ADDED SEWER REVISIONS TO TR. 11279 LOT 2 PER ENGR.	4		"
7C	ADDED SEWER TIE TO EXIST. MH & SEWER TO LOT 3 PER ENGR.	4		"
8	ADDED PRIVATE STREET IMPROVEMENTS PER ENGR.	4, 7		2-15-84
9	ADDED PARKWAY CULVERTS TO TR. 11279, REVISED TRENCH DETAIL	4, 7		3-15-84

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON THE SOUTHERLY LINE OF TRACT NO 9110 BEING N71°56'50"W AS SHOWN ON A MAP FILED IN BOOK 394, PAGES 45, 46, AT 47 AB, OF MISCELLANEOUS MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA, SAID BEARING BEING ROTATED COUNTERCLOCKWISE 0°06'01" FOR THE PURPOSE OF THIS PLAN.

BENCH MARK

3E-61-71

ALUMINUM CAP STAMPED 3E-61-71 ALSO 1 INCH BRASS TOOLED CO. FOUND IN TOP OF CONC. MONUMENT AT THE INTERSECTION OF SERRANO CREEK & THE NORTHERLY PROLONGATION OF THE CENTERLINE OF LA PASEO, ABOUT 0.2 MI. N.W. ALONG TRABUCO RD. FROM THE INTERSECTION OF SERRANO CREEK & TRABUCO RD. SET IN TOP OF NE END OF CONC. HEAD WALL OF BRIDGE, LEVEL WITH ROAD.

ELEV. 444.561 - 1970 ADJ.

Hunsaker & Associates Inc
Town R. Mc Hannon 10-13-82
R.C.E. 23556 DATE

DEVELOPER:
HARRINGTON DEVELOPMENT CORP.
841 LANGLEY AVE.
IRVINE, CA. 92714
(714) 557-5511

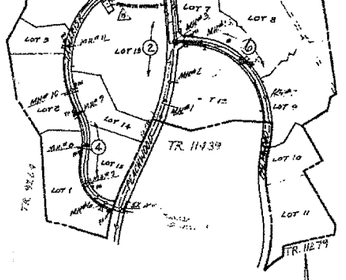
SHANAHAN HOMES
1400 BEACH BLVD. STE W
WESTMINSTER, CA
(714) 534-9430

FIRE PROTECTION APPROVAL:
Otis Peralta 1-13-83
ORANGE COUNTY FIRE DEPARTMENT DATE

COUNTY OF ORANGE
E.M.A. REGULATION DIVISION

APPROVED BY: Floyd H. McFall Jr. RCE 9804 2/7/83
R.C.E. DATE

THIS PLAN IS SIGNED BY E.M.A./REGULATION FOR CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. E.M.A./REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS OR ACCURACY.



INDEX MAP
N.T.S.

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS: AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, THE ENGINEER, AND THE COUNTY OF ORANGE HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM SOLE NEGLIGENCE OF OWNER, ENGINEER OR COUNTY OF ORANGE.

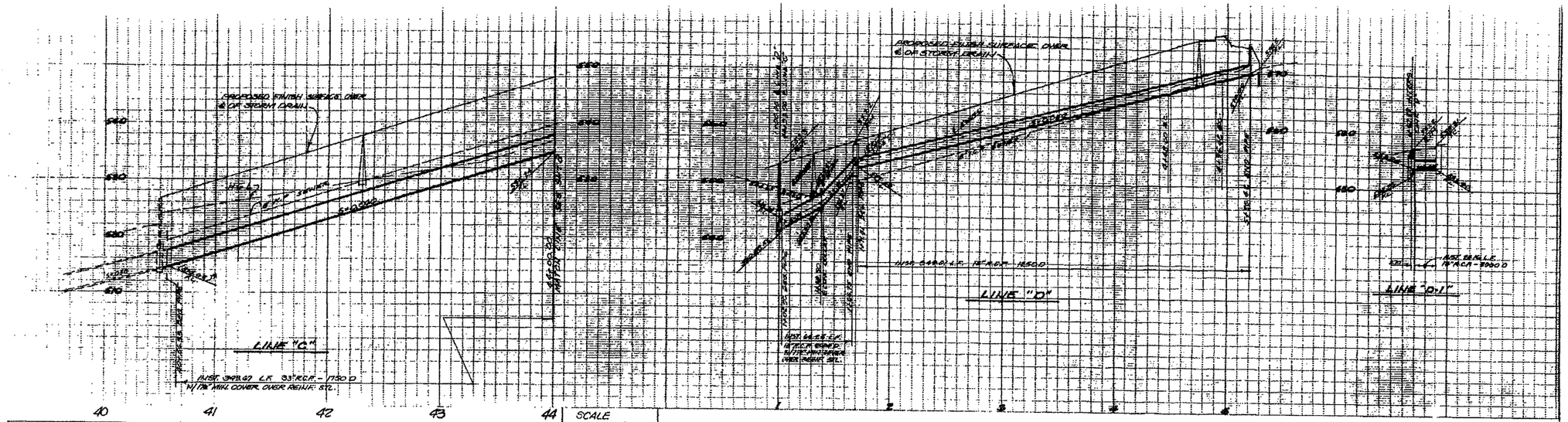
LEGEND:

	STREET	NAME	SIGNS
V.C.P. SEWER MAIN & MANHOLE	LOCATION	NAME @	NAME
STREET LIGHT (5800 LUMENS)	SE	PEACHWOOD	PALMWOOD
STREET NAME SIGN	NW	PEACHWOOD	TAMARISK
FIRE HYDRANT			
A.C.P. WATER LINE			
BUTTERFLY VALVE			
BLOW OFF			
R.C.P. STORM DRAIN			
STREET LIGHT (10,000 LUMENS)			
DOUBLE STREET LIGHT (8,000 LUMEN)			
STREET LIGHT (22,000 LUMENS)			

IMPROVEMENT PLANS
A PORTION OF TENTATIVE TRACT No. 10931
SERRANO HIGHLANDS
TRACT No. 10931 & 12304
TITLE SHEET

SHEET 1 OF 9 SHEETS

TR. TMP # 10931



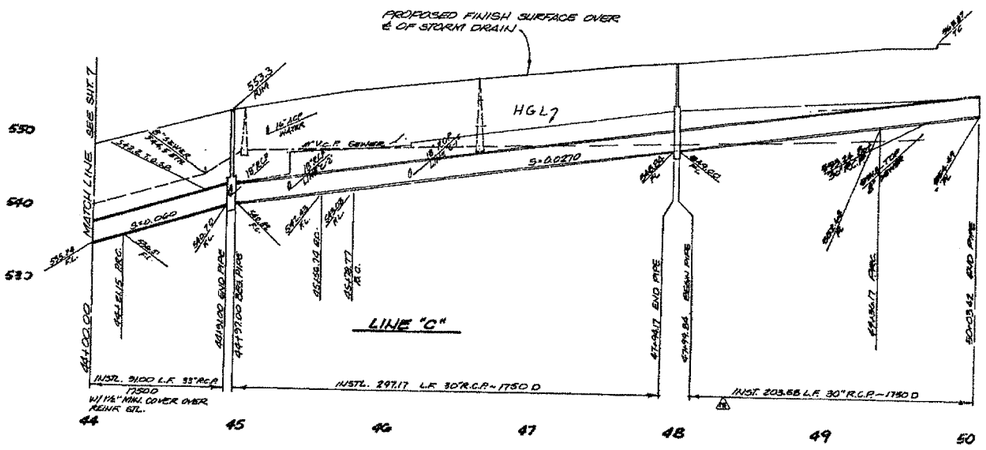
HYDRAULIC DATA

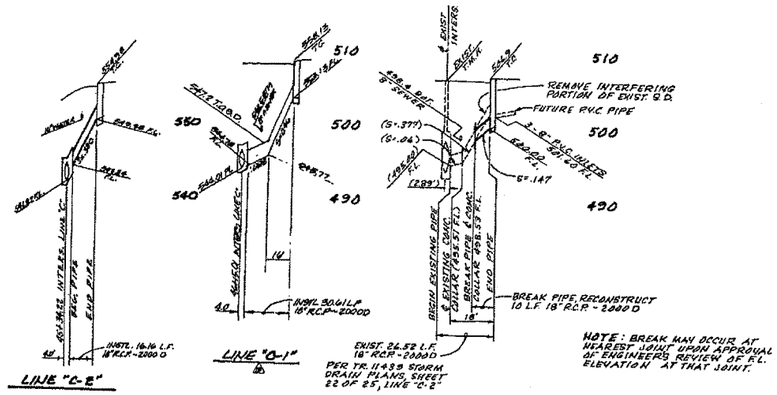
LINE	STA. TO STA.	Q	D/A	Go	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
C	40+50 - 44+93	92.1	3"	.060	.013	—	—	—	1.713	23.67	[illegible]	[illegible]
D	1+00 - 1+38	18.5	18"	.100	.013	—	—	—	.806	13.12	10.47	.0310
D	1+38 - 1+71	18.5	18"	.210	.013	—	—	—	.648	25.29	10.47	[illegible]
D	1+71 - 5+20	17.1	18"	.050	.013	—	—	—	.950	14.49	9.68	.0265

SHEET 7 OF SHEETS 9

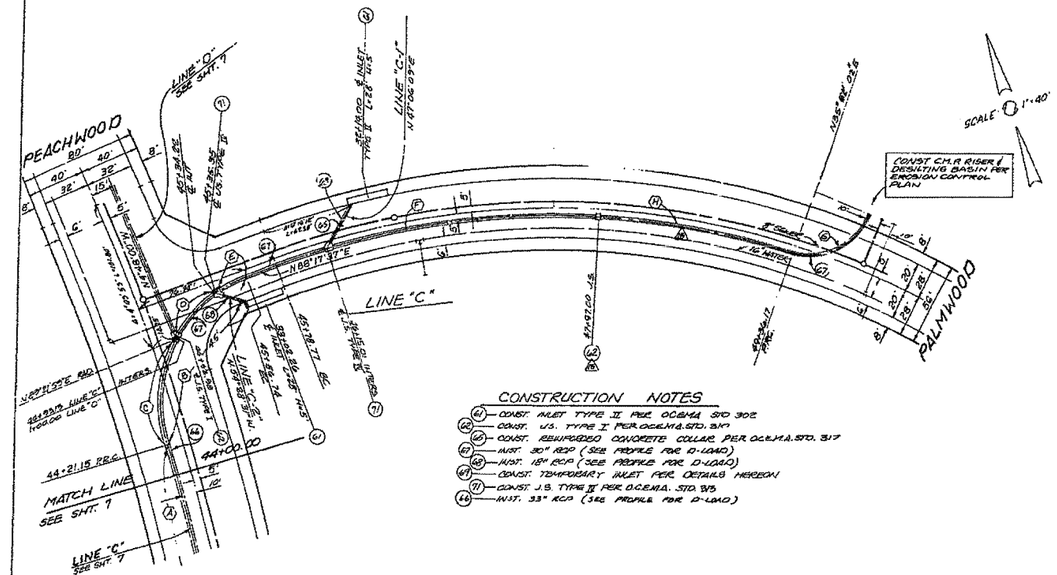
TRAC 10931

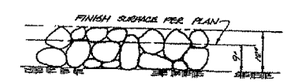
TR. IMP. #10931





LATERAL RECONSTRUCTION DETAIL
IN TAMARISK - STA. 5+08.00 & INLET - SHEET 4





GROUTED RIP-RAP
TYPICAL SECTION
NO SCALE

1. ROCK FOR GROUTED RIP-RAP SHALL BE GOOD QUALITY BROKEN CONCRETE AND/OR RIVER RUN ROCK. THE SMALLEST DIMENSION SHALL EXCEED 3 INCHES AND THE LARGEST DIMENSION SHALL NOT EXCEED 18 INCHES. THE LARGEST DIMENSION SHALL NOT EXCEED 4 TIMES THE SMALLEST DIMENSION.
2. THERE SHALL BE A GROUT BED OF AT LEAST 2 INCHES BENEATH THE FIRST LAYER OF ROCK. ALL THE VOIDS BETWEEN THE ROCKS SHALL BE FILLED WITH GROUT. MAXIMUM SPACING BETWEEN THE ROCKS SHALL BE 2 INCHES. SURFACE ROCKS SHALL BE IMBEDDED FROM 1/2 TO 2/3 THEIR VERTICAL DIMENSION.

CONSTRUCTION NOTES

(61) — CONST. INLET TYPE II PER OCEMA STD 302
(62) — CONST. U.S. TYPE I PER OCEMA STD. 310
(65) — CONST. REINFORCED CONCRETE COLLAR PER OCEMA STD. 317
(67) — INST. 30" RCP (SEE PROFILE FOR D-LOAD)
(68) — INST. 18" RCP (SEE PROFILE FOR D-LOAD)
(69) — CONST. TEMPORARY INLET PER DETAILS HEREON
(71) — CONST. J.S. TYPE II PER OCEMA STD. 315
(66) — INST. 33" RCP (SEE PROFILE FOR D-LOAD)

(H)	14° 19' 26"	545'	136.33	68.82
(E)	14° 20' 12"	90'	22.52'	11.32'
(D)	26° 09' 31"	90'	41.09'	20.91'
(C)	45° 49' 28"	90'	71.98'	38.04'
(B)	86° 19' 11"	90'	135.59	84.40'
(A)	15° 17' 56"	1390'	371.15'	186.69'
(G)	86° 37' 33"	45'	67.25'	41.69'
(F)	31° 14' 29"	545'	197.17	152.38'
	Δ	R	L	T

HORIZONTAL CURVE DATA

HYDRAULIC DATA

LINE	STA TO STA	Q	DIA	So	n	Qc	Vc	Sc	On	Vn	Vf	Sf
C	44+91 - 45+35	76.8	30"	.0231	.013	FULL	—	—	FULL	—	15.65	.03506
C	45+35 - 46+15	60.1	30"	.0231	.013	FULL	—	—	1.97	14.49	12.24	.02147
C	46+15 - 50+03	43.3	30"	.0270	.013	2.20	3.48	.0101	1.46	14.58	8.82	.01114

SHEET 8 OF SHEETS 9

TR. IMP. #10931

B. TRACT 12603 STORM DRAIN IMPROVEMENT PLANS

IMPROVEMENT PLANS FOR
TRACT 12603
PORTION OF TRACT 10931
LOTS 7, 8 & 9

BLOCK 545G
MODULE 53 & 54

112 UNITS

GENERAL NOTES

1. THIS NOTE HEREIN INCORPORATES BY REFERENCE, THOSE GENERAL NOTES NUMBERED 1 THROUGH 17 INCLUSIVE, OF OCEMA STANDARD PLAN 801, 1983 EDITION AND MARCH 1985 SUPPLEMENT.
2. THE DEVELOPER / CONTRACTOR SHALL HAVE A COPY OF THE CURRENT OCEMA STANDARD PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
3. THE DEVELOPER SHALL TELEPHONE EMA / PUBLIC WORKS / CONSTRUCTION AT LEAST 24 HOURS PRIOR TO STARTING CONSTRUCTION WORK SUBJECT TO EMA / PUBLIC WORKS' INSPECTION.
4. ALL HIGHWAY SIGNS AND STREET NAME SIGNS SHOWN ON THE PLAN MUST BE SUPPLIED AND INSTALLED BY THE DEVELOPER PER OCEMA STANDARD PLAN NOS. 407, 408, 409 AND 417.
5. ALL CONCRETE CURB AND GUTTER FLOWLINES WITH LESS THAN 1% GRADE SHALL BE WATER TESTED PRIOR TO FINAL FINISHING TO INSURE PROPER DRAINAGE WITHOUT UNACCEPTABLE HIGH OR LOW SPOTS.
6. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY OCEMA REGULATION.
7. ALL DAMAGED CONCRETE SIDEWALKS OR CURBS SHALL BE SAWCUT TO THE NEAREST TRANSVERSE SCORE MARK OR ADJUSTABLE CONTROL JOINT OR WEAKENED PLANE JOINT AND REPLACED IN CONFOMANCE WITH THE APPLICABLE PROVISIONS OF OCEMA STANDARD PLANS.
8. DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, CLEAN, DUST FREE AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF COUNTY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS. NO STOCKPILING OF BUILDING MATERIALS WITHIN THE COUNTY RIGHT-OF-WAY WITHOUT THE PERMISSION OF COUNTY'S INSPECTOR.
9. PRIOR TO FINAL ACCEPTANCE OF STREET IMPROVEMENTS, ALL STREET PAVEMENT, STRIPING AND STENCILING WITHIN THE PERIMETER OF THE CONSTRUCTION PROJECT WILL BE RESTORED TO A "LIKE NEW" CONDITION, IN A MANNER MEETING THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS. ALL STRIPING AND STENCILING SHALL BE ACCORDING TO STANDARD PLAN NO.801, NOTE 17.
10. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES AND SHALL BE PROTECTED WITH ADEQUATE BARRICADES, LIGHTS, SIGNS AND WARNING DEVICES AS PER THE CURRENT STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, MANUAL OF TRAFFIC CONTROLS AND TO THE DIRECTIONS OF THE COUNTY'S INSPECTOR.
11. OCEMA STANDARD PLANS SHALL TAKE PRECEDENCE OVER ANY CONFLICTS EXCEPT FOR STANDARD PLANS AFFECTING UTILITY COMPANIES, IF THEIR STANDARDS ARE MORE STRINGENT.
12. ANY UTILITIES UNDER PAVED AREAS OF PRIVATE STREETS SHALL HAVE A MINIMUM OF 30" COVER AND DEVELOPER SHALL PROVIDE PRIVATE LABORATORY COMPACTION CERTIFICATION FOR ALL UNDERGROUND UTILITIES PRIOR TO ANY PAVING. DEVELOPER SHALL SET UP A MEETING WITH THE INSPECTOR AND THE PRIVATE LABORATORY PRIOR TO ANY TESTING.
13. A.C. PAVEMENT PLACED UNDER CARPORTS / ROOFS SHALL BE SLURRY SEALED BEFORE FINAL ACCEPTANCE.
14. *NO CONCENTRATED FLOW ALLOWED ACROSS ASPHALT PAVEMENT.*
15. *ALL ON SITE STREET LIGHTS ARE TO BE CONSTRUCTED AND MAINTAINED AS A PRIVATE SYSTEM.*
16. *PARKING LOT SIGNING AND STRIPING SHALL CONFORM TO O.C.E.M.A. STANDARD 681.*

WATER NOTES

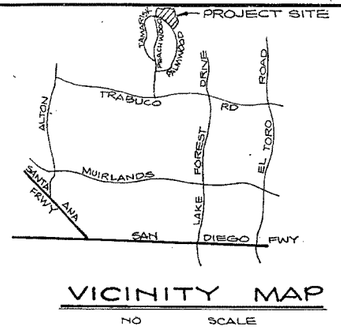
1. THE WATER SYSTEM SHALL CONFORM TO THE LOS ALISOS WATER DISTRICT'S "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEM" AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING-DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CALL 714-830-0580.
4. WATER MAINS SHALL BE INSTALLED 6-FEET OFF THE CURB FACE, UNLESS OTHERWISE INDICATED, AND PRIOR TO PAVING OF THE STREETS.
5. FIRE HYDRANTS AND BLOWOFFS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROPRIATE DETAILS HEREIN AND INSTALLED BEHIND CURBS AND SIDEWALKS WHERE THE SIDEWALKS ARE ADJACENT TO CURBS.
6. METER SERVICES SHALL BE SIZED BY THE LOS ALISOS WATER DISTRICT.
7. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
8. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E C 246 MANUFACTURED BY MINNESOTA MINING AND MANUFACTURING AFTER INSTALLATION INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C105.
9. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
10. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT.
11. ALL HOUSE SERVICES BELOW THE FOLLOWING WATER ZONE ELEVATIONS SHALL BE FURNISHED WITH A PRESSURE REDUCING VALVE SET AT A MAXIMUM PRESSURE OF 80 PSI.

DISTRICT WATER ZONE	PRV REQUIRED BELOW ELEVATION
I	835
II	680
III	865

12. ALL WATER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "W" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
13. WATER METERS LOCATED IN DRIVEWAY AREAS WILL NOT BE ACCEPTED. THE DEVELOPER SHALL RELOCATE SUCH METERS TO A LOCATION ACCEPTABLE TO THE DISTRICT INSPECTOR.
14. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OF PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
15. A SET OF "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

SEWER NOTES

1. ALL SANITARY SEWER WORK SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF SEWERS" OF THE LOS ALISOS WATER DISTRICT. THE CONTRACTOR SHALL KEEP A COPY OF THE STANDARD SPECIFICATIONS AND DRAWINGS ON THE JOB SITE AT ALL TIMES.
2. FOUR COPIES OF APPROVED CONSTRUCTION PLANS SHALL BE FURNISHED TO THE DISTRICT ENGINEER'S OFFICE PRIOR TO BEGINNING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO ANY INSPECTION. CALL (714) 830-0580.
4. FOUR-INCH, INTERNAL DIAMETER, VCP HOUSE CONNECTIONS ARE TO BE CONSTRUCTED FROM THE SEWER MAIN LINE TO THE PROPERTY LINE FOR EACH LOT OR AS SHOWN ON THE PLANS.
5. ALL SEWER MAINS, HOUSE CONNECTIONS, AND APPURTENANCES SHALL BE CONSTRUCTED PRIOR TO PAVING OF THE STREET.
6. SEWER LENGTHS ARE CALCULATED ON HORIZONTAL DISTANCES.
7. VCP STUBS AND THE FIRST TWO JOINTS OUT OF ALL MANHOLES SHALL BE ONE FOOT MAXIMUM MEASURED FROM THE INSIDE WALL OF THE MANHOLE.
8. THE SURVEYOR SHALL STAKE THE LOCATION OF ALL WYE FITTINGS. ALL HOUSE LATERALS NOT NORMAL TO STREET SEWERS SHALL HAVE END OF LATERAL AT PROPERTY LINE STAKED AND TIED TO A PROPERTY LINE AS SHOWN ON THE PLANS.
9. IT SHALL BE THE RESPONSIBILITY OF THE SEWER CONTRACTOR TO EXPOSE ALL JOINT POINTS TO EXISTING LINES AND TO HAVE THE LOCATION AND ELEVATION VERIFIED BY THE DISTRICT ENGINEER PRIOR TO ANY SEWER STAKES BEING FURNISHED.
10. THE LOS ALISOS WATER DISTRICT WILL INSPECT ALL MAIN LINE SEWERS. THE ORANGE COUNTY BUILDING AND SAFETY DEPARTMENT WILL INSPECT AND CERTIFY ALL HOUSE LATERALS. A MINIMUM OF 10 FEET 6 INCHES OF HOUSE LATERAL SHALL BE INSTALLED AND INSPECTED BY THE ORANGE COUNTY BUILDING AND SAFETY DEPARTMENT AND TESTED JOINTLY WITH THE MAIN LINE UNDER THE JURISDICTION OF THE LOS ALISOS WATER DISTRICT.
11. IN ORDER TO PREVENT ACCIDENTAL USE OF THE NEW SEWER PRIOR TO COMPLETION AND ACCEPTANCE, THE INLET OF THE DOWNSTREAM EXISTING MANHOLE SHOULD BE PLUGGED WITH BRICK AND MORTAR.
12. NO FACILITY SHALL BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
13. SEWER MAIN OWNERSHIP - UPON COMPLETION OF ALL TESTS AND DEDICATION BY THE DEVELOPER, OPERATION AND MAINTENANCE SHALL BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT.
14. SEWER LATERAL OWNERSHIP - UPON COMPLETION OF ALL TESTS AND ACCEPTANCE BY THE ORANGE COUNTY BUILDING DEPARTMENT, OPERATION AND MAINTENANCE SHALL NOT BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT.
15. PROVIDE A CLEANOUT STUB OUTSIDE OF THE HOUSE OR GARAGE AND IDENTIFY WITH A LANDMARK TO FACILITATE SEWER HOUSE LATERALS AND MAIN LINE CLEANING.
16. ALL SEWER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "S" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
17. THE SEWER IMPROVEMENTS AND SEWER SYSTEM OPERATIONS ARE APPROVED, SUBJECT TO FUTURE SEWER DISCHARGES CONFORMING TO THE LOS ALISOS WATER DISTRICT "RULES AND REGULATIONS FOR SEWER CONSTRUCTION, SEWER USE AND INDUSTRIAL WASTE WATER DISCHARGES AND FUTURE REVISIONS."
18. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OF PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
19. A SET OF "AS-CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.



VICINITY MAP

NO SCALE

STORM DRAIN GENERAL NOTES:

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 POUNDS PER SQUARE INCH, IN 28 DAYS, TYPE OF PORTLAND CEMENT CONCRETE, TO BE DETERMINED BY O.C.E.M.A. MATERIALS LAB.
2. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA REQUIREMENTS.
4. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE A MINIMUM OF TWO FEET OF FILL ABOVE THE TOP OF PIPE
5. *LOCAL DEPRESSIONS AND DRAINS OF CURB INLETS SHALL NOT BE EXPOSED UNTIL ADJACENT CURB AND GUTTER HAS BEEN POURED.*
6. ALL WORK MUST BE IN CONFORMANCE WITH THE ORANGE COUNTY E.M.A. STANDARD SPECIFICATIONS WHICH MAY BE PURCHASED FROM THE COUNTY AND MUST BE KEPT ON THE JOB SITE AT ALL TIMES.
7. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
8. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER O.C.E.M.A. STANDARD 319.
9. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPERS' SOIL ENGINEER SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAINS SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
10. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE O.C.E.M.A. MATERIALS LAB IN ACCORDANCE WITH THE NUMBER, LOCATION, AND FRENQUECY REQUESTED BY THE O.C.E.M.A. INSPECTOR.
11. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
12. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AL ALTERNATE INTERSECTIONS.
13. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
14. ALL PIPE IS TO BE BANDED AND GROUTED.
15. R.C.P. SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
16. ALL CATCH BASINS AND LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS.
17. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.

NOTICE TO CONTRACTOR :
CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, THE ENGINEER, AND THE COUNTY OF ORANGE HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM SOLE NEGLIGENCE OF OWNER, ENGINEER, OR COUNTY OF ORANGE.

NOTE: PRIOR TO CONSTRUCTION OF ANY CONCRETE STRUCTURE, THE CONCRACTOR SHALL VERIFY WITH THE SOILS ENGINEER, THE TYPE OF CONCRETE RECOMMENDED.

EXISTING UNDERGROUND STRUCTURES

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES OR CONDUITS SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE THE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK. CONTRACTOR FURTHER ASSUMES ALL LIABILITY AND RESPONSIBILITY FOR THE UNDERGROUND UTILITY PIPES, CONDUITS OR STRUCTORS SHOWN OR NOT SHOWN ON THESE PLANS.

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS SNYDER
NO. 24068
CIVIL
STATE OF CALIFORNIA

E. PARNELL	12-85	E. PARNELL	12-85	
DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY DATE

NOTICE TO CONTRACTOR:
CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

BENCHMARK

ALUMINUM CAP STAMPED 3E-61-71 ABOUT 1 MI. N.W. ALONG TRABUCO RD., FROM INT. OF EL TORO RD. & ABOUT 0.2 MI. N.W. ALONG TRABUCO RD., FROM INT. OF CANADA RD. TO CONCRETE BRIDGE OVERCROSSING OF SERRANO CREEK, 16' N.E. OF CENTERLINE OF TRABUCO. SET IN TOP OF N.E. END OF CONC. RETAINING WALL OF BRIDGE. LEVEL WITH ROD.
ELEV. 444.561 1970 ADJ.

BASIS OF BEARINGS:

THE BEARINGS SHOWN HEREON ARE BASED ON THE EASTERLY LINE OF TRACT NO. 9110 BEING N.11° 05'40"W. AS SHOWN ON A MAP FILED IN BOOK 391, PAGES 45, 46, 47 & 48, OF MISCELLANEOUS MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA. SAID BEARING BEING ROTATED COUNTERCLOCKWISE 0° 00'21" FOR THE PURPOSE OF THIS PLAN.

DEVELOPER
WARMINGTON DEV. CO.
3090 PULLMAN
COSTA MESA, CA. 92626
(714) 557-5511

FIRE PROTECTION APPROVAL
ORANGE COUNTY FIRE DEPARTMENT — DATE 1-9-86

COUNTY OF ORANGE
E.M.A. TRAFFIC ENGINEERING DIVISION

APPROVED
BY: [signature] 29268 (3/87) R.C.E. — DATE 5/9/86
THIS PLAN IS SIGNED BY E.M.A.T.E.D. FOR CONCEPT AND ADERENCE TO COUNTY SIGNING AND STRIPING STANDARDS AND REQUIREMENTS ONLY. E.M.A.T.E.D. IS NOT RESPONSIBLE FOR DESIGN ASSUMPTIONS OR ACCURACY.

COUNTY OF ORANGE
E.M.A. REGULATION DIVISION

APPROVED
BY: [signature] R.C.E. 23196 — DATE 5-29-1986
THIS PLAN IS SIGNED BY E.M.A./REGULATION CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. E.M.A./REGULATION IS NOT RESPONSIBLE FOR DESIGN ASSUMPTIONS, OR ACCURACY.

IMPROVEMENT PLANS
TRACT 12603
PORTION OF TRACT 10931
LOTS 7, 8 & 9
SHEET NO. 1 OF 12 SHEETS

NO.	DESCRIPTION	SHT.	APPROVED	DATE
2	REVISED ARCHITECTURAL PAVING DETAIL PER "AS BUILT" CONDITIONS	3	As built	
1	REVISED STREET GRADE W'LY INTERSECTION	7	[signature]	12/1/87

REVISIONS

NO.	L.A.W.D. REVISIONS	APPROVED	DATE

LOS ALISOS WATER DISTRICT

LOS ALISOS WATER DISTRICT FOR WATER AND SEWER IMPROVEMENTS: [signature] R.C.E. 26533 — DATE 4/24/86

LOS ALISOS WATER DISTRICT FOR WATER AND SEWER OPERATION: E.T. Mc Faddenjr GENERAL MANAGER — DATE 4/24/86

PREPARED BY
HUNSAKER AND ASSOCIATES INC.
THREE HUGHES
IRVINE, CA. 92718
(714) 855-3600
[signature] 1-6-86
DOUGLAS SNYDER R.C.E. 24068 DATE

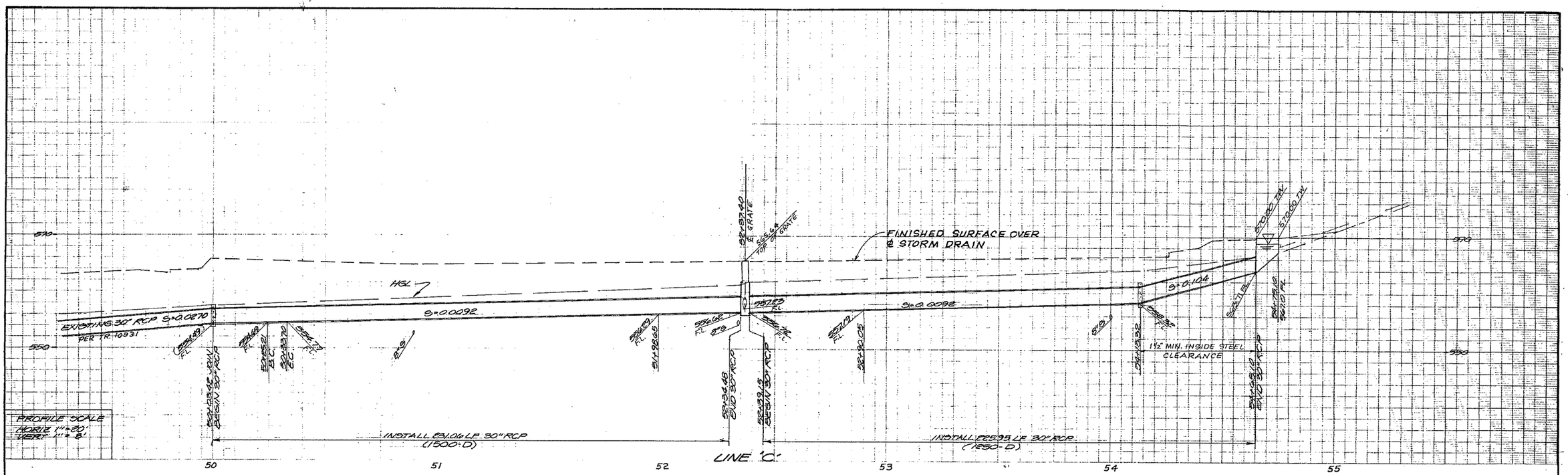
EXPIRATION DATE 12-31-89

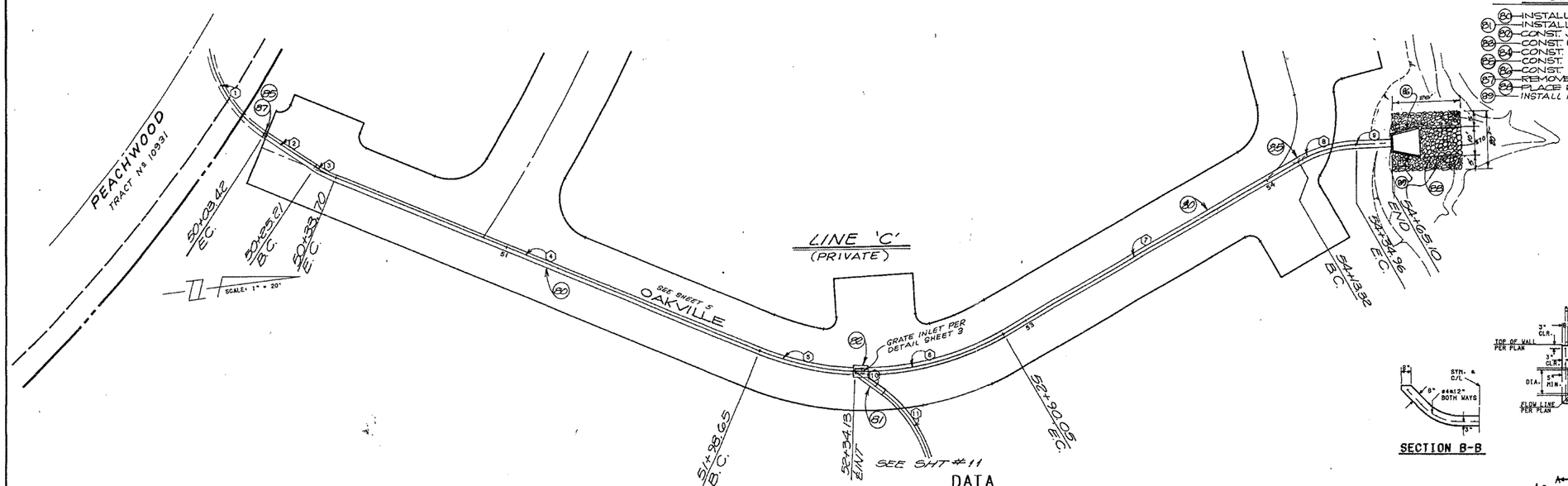
TITLE SHEET

175(20-243)FF: 12174.16 24-Aug-84 02:56 PM / 061-12174-650

TR. IMP.: 12603

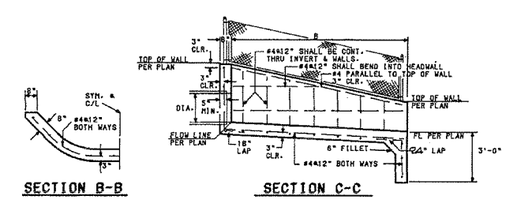
W.O. 107-12603 BMP <2933> 475A





CONSTRUCTION NOTES

- (80) INSTALL 30" R.C.P. (D-LOAD PER PROFILE)
- (81) INSTALL " R.C.P. (D-LOAD PER PROFILE)
- (82) CONST. JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD 310
- (83) CONST. INLET TYPE II PER O.C.E.M.A. STD 302
- (84) CONST. CONC. SLOPE ANCHOR PER O.C.E.M.A. STD 333
- (85) CONST. CONC. COLLAR PER O.C.E.M.A. STD 317
- (86) CONST. INLET STRUCTURE PER DETAIL HEREON
- (87) REMOVE BRICK AND MORTAR PLUG & JOIN
- (88) PLACE RIP RAP PER STD. PLAN 809
- (89) INSTALL FENCE PER O.C.E.M.A. STD. 412



OUTLET DIMENSIONS			
SYMBOL	DIA	B	C
	30"	10	5

HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
C	50+03-50+25	52.5	30	0.0092	.013	2.33	11.0	0.014	full	—	—	0.0164
C	50+25-50+33	52.5	30	0.0092	.013	2.33	11.0	0.014	full	—	—	0.0164
C	50+33-51+98	52.5	30	0.0092	.013	2.33	11.0	0.014	full	—	—	0.0164
C	51+98-52+34	52.5	30	0.0092	.013	2.33	11.0	0.014	full	—	—	0.0164
C	52+39-52+90	43.3	30	0.0092	.013	2.20	9.46	.010	full	8.82	8.82	0.0111
C	52+90-54+13	43.3	30	0.0092	.013	2.20	9.46	.010	full	8.82	8.82	0.0111
C	54+13-54+65	43.3	30	0.104	.013	2.20	9.46	.010	0.98	24.12	8.82	0.0111

DATA

⬡	DELTA/BEARING	RADIUS	LEN./DIST.	TANGENT
1	(85°37'33")	(45.00)	(67.25)	(41.69)
2	N 40°14'28"E		21.79	
3	10°48'28"	45.00	8.49	4.26
4	N 29°26'00"E		164.95	
5	20°19'43"	100.00	35.48	17.93
6	32°02'17"	100.00	55.92	28.71
7	N 22°56'00"W		123.27	
8	27°33'15"	45.00	21.64	11.03
9	N 04°37'15"E		30.14	
10	N 43°56'53"E		12.85	
11	33°21'02"	45.00	26.19	13.48

(86) INLET DETAIL
NO SCALE

SHEET 10 OF SHEETS 12
TRACT 12603

107-12603
(29331) 475A

STORM DRAIN PLANS LOTS 7,8 & 9 - 366[20.3]PF: 12603 626 14-Mar-86 07:31 / 186-10931-650

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