SUNSET RIDGE PARK
City of Newport Beach, CA

PRELIMINARY HYDROLOGY REPORT

Prepared For:

City of Newport Beach
3300 Newport Blvd.
Newport Beach, CA 92663
949-644-3342

Prepared By:

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS

Urban Resource Corporation
23 Mauchly, Suite 110
Irvine, CA 92618

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Terry P. Au, P.E.
State of California No. 68466

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INTRODUCTION

The following site is located in the City of Newport Beach, at the northwest intersection of Superior Avenue and West Coast Highway, in the County of Orange. The project is a city park with proposed soccer fields, softball field, parking lot, and entry road via West Coast Highway. Sunset Ridge Park has an approximate area of 20.4 acres, within the limits of work. The total area of analysis is approximately 77 acres, and includes offsite and onsite runoff, for both conditions.

This study is prepared to determine the 10 year and 25 year runoff for the proposed site for the existing and proposed condition to develop onsite storm systems, including storm drains, catch basins, and/or detention system(s). Preliminary recommendations to mitigate any increased flows from the development are provided herewith.

METHODOLOGY

The existing and proposed condition rational method peak flows were analyzed using the Advance Engineering Software (AES) package for Orange County, which complies with the County of Orange Hydrology Manual, 1996 Addendum No. 1, 85% Upper Confidence Level Procedure. The software computes peak flows based on the Rational Method, and follows the requirements of the County of Orange Hydrology Manual. Existing drainage patterns, and existing reference plans are utilized to determine drainage patters for this study. For the purpose of modeling, the site and all tributary areas of the site, are divided into smaller subareas to more accurately model drainage patterns. Once all areas are divided into smaller subareas, intial subareas with flow patterns are determined for software use. All areas and flow patterns are considered and used in the AES software for modeling, to provide peak flowrates. Additionally, the parameters for the rational method hydrology analysis for the existing and proposed condition are listed below:

1) Storm Events – 10 year and 25 year
2) Soil Type D
3) AMC II (Existing and Proposed Condition)
4) Land Use – Fair Open Brush (Existing and Proposed Condition)
5) Land Use – Apartments (Existing Condition)
6) Land Use – Public Park (Proposed Condition)
7) Land Use – Commercial, Parking Lot (Proposed Condition)

Soil type D is used for the entire analysis in both the existing and proposed conditions for a conservative analysis.

SITE STORM DRAIN SYSTEM

Existing Condition

The existing site drainage patterns route storm water southerly and westerly and is collected by an existing Caltrans 8’x5’ RCB in West Coast Highway. The existing site collects drainage via concrete v-ditches and terrace drains. Approximately 39.0 acres of runoff from Tract 7852 and Tract 7817, an apartment site to the north, outlet into the existing concrete v-ditch that runs southerly and ties into concrete box culvert in West

Coast Highway. Approximately 3.9 acres of Tract 7852 to the north, drains easterly into Superior Avenue and is collected by existing catch basins, located on the west side of Superior Avenue, before entering the onsite concrete v-ditch and is routed to the concrete box culvert in West Coast Highway. A portion of street runoff from Superior Avenue is also collected and routed onsite via the onsite concrete v-ditch. All other Superior Avenue flows are collected by an existing catch basin on the east side of Superior Avenue and routed easterly through Tract 8336. Additionally, portions of the existing Banning Ranch also contribute to the existing box culvert. Capacity calculations for the box culvert flowing full are provided in the appendix for reference. Refer to the existing condition hydrology map for additional details.

Proposed Condition

Drainage patterns for the developed site will maintain patterns similar to the existing condition, and will ultimately drain into the existing Caltrans box culvert in West Coast Highway. Detention basin(s) will be provided onsite to ensure that the proposed condition peak flows are reduced to meet the existing condition. Any necessary permits with Caltrans will be applied for accordingly.

The proposed condition storm drain system will route all onsite and offsite flows to the existing concrete box culvert with the use of multiple storm routing systems. The proposed storm drain systems that will collect onsite and offsite flows will consist of a bio-swale, interceptor drains, entry road flow basin, offsite flow basins, onsite dry creek, RCP storm drain, PVC storm drain, and an underground CMP detention system. Additionally, a gravel subdrain system will be provided across the park to pick up ground water seepage coming from percolated surface runoff and irrigation runoff via the apartment site to the north. Details of the storm routing systems are listed below. Also, refer to Exhibit A for the proposed storm system preliminary layout.

1. Bio-Swale – Located adjacent to the park entry road. Provided to detain and treat storm water flows in entry road and adjacent slope.
2. Interceptor Drains – Located between bio-swale and proposed parking lot. Provided to collect runoff from existing preserved nature area and adjacent slope.
3. Entry Road Flow Basin – Located at the intersection of West Coast Highway and the proposed entry road. Provided to collect flows from the entry road, preserved nature area, and slopes. This basin is located and sized based on the ultimate alignment of the Banning Ranch entry road, and will not be in conflict with future sidewalk.
4. Offsite Flow Basins – Located at the northern corner of the site, and to the west of Tract 7817. Provided to collect offsite flows.
5. Onsite Vegetated Dry Creek – Located within proposed parking lot, and routed to drain beneath a portion of the parking lot via culvert crossing. Provided to collect and treat flows from the parking lot.
6. RCP Storm Drain – Located throughout the site. Provided to collect offsite and offsite runoff. Refer to Exhibit A for preliminary sizes.
7. PVC Storm Drain – Located throughout park. Provided to collect onsite flows.
8. Underground CMP Detention System – Tentatively located along southern edge of baseball field. Provided to reduce proposed condition flows to the existing condition flows. Sizing for the system will be provided in the Final Hydrology Report. The system will likely consist of 96” CMP in a parallel and grid like

orientation. Flows will enter the system via the area drain line(s), and also outlet via a smaller pipe sized accordingly, to allow for storage in the system, which would provide the reduction in peak flows in the proposed condition.

9. Gravel Subdrain System – Located across the southern edge of the park. Provided to collect ground water flows. The system is 2'-3' wide along the whole drainage curtain, and has a height of 10'-20', per soils recommendations. It is provided to collect groundwater seepage from the apartment site to the north, as well as any percolated runoff from the park, keeping seepage from outletting to the slope along West Coast Highway, which would cause slope erosion.

All existing concrete v-ditches and terrace drains onsite will be removed, and all offsite flows will be routed by proposed RCP storm drain lines. Refer to Exhibit A for additional information.

NOTE: A 36" RCP storm drain connection will be provided for future connection, to collect future flows. Current sizing is based on the Newport Banning Ranch Hydrology Report (Ref. 9), dated in 2008, prepared by Fuscoe Engineering. The pipe sizing is based on a 10 year peak flow of 39.14 cfs, located at Node 16.60, in the report. Sizing of the pipe is preliminary, and sizing will be coordinated with Fuscoe Engineering, if necessary.

CONCLUSION/RECOMMENDATIONS

Hydrology analysis of the existing and proposed condition show an increase in peak flows, of 10.84 cfs and 13.27 cfs, for the 10 year and 25 year storm events, respectively, due to the development. The proposed mitigation measures to reduce the peaks flows from the proposed condition, to that of the existing condition peak flows per the table below, include an underground CMP Detention System tentatively located just south of the proposed baseball field.

Additionally, other detention systems that may be considered during final design include, but is not limited to, rain gardens, infiltration trenches, storm vaults, and underground retention systems.

Sizing and final details of detention systems will be provided in the site final hydrology report.

A summary of the rational method analysis for the existing and proposed condition can be found in Table 1 provided below. Also refer to the hydrology maps provided herewith for additional information.

Table 1 – Summary of Rational Method Analysis

Description	Q10 (cfs)	Q25 (cfs)
Existing Condition - Node 35	144.72	175.50
Proposed Condition - Node 67	155.56	188.77
Flow Increase/Decrease:	**+10.84**	**+13.27**

II. REFERENCES

1. Hydrology Manual, County of Orange, October 1986.
2. RATSCx, Advanced Engineering Software (AES), 2008.
3. HELE I, Advanced Engineering Software (AES), 2008.
4. Tract 7852 Street Improvement Plan, 1972.
5. Tract 7817 Street Improvement Plan, 1973.
6. Tract 7852 Offsite Sewer and Strom Channel Plan, 1972.
7. CalTrans Project Plans for Construction on State Highway (R-5569-S), 1989.
8. Tract 8336 Streets, Water, and Storm Drain Improvement Plan, 1990.
9. Newport Banning Ranch Hydrology Report, prepared by Fuscoe Engineering.

RATIONAL METHOD Q10 HYDROLOGY
-Existing Condition-

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********************************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2008 Advanced Engineering Software (aes)
         Ver. 15.0  Release Date: 04/01/2008  License ID 1585

                        Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
 * SUNSET RIDGE PARK                                                        *
 * EXISTING CONDITION HYDROLOGY - 10 YEAR EVENT                             *
 * INCLUDES OFFSITE RUNOFF FROM TRACT 7852, 7817, AND PORTION OF SUPERIOR   *
 **************************************************************************

  FILE NAME: 192-EX10.10
  TIME/DATE OF STUDY: 15:55 06/29/2009
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                 --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)    (FT)      SIDE / SIDE/ WAY    (FT)   (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
 1   36.0    18.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
 ----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    853.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     88.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.402
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.531
  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.)
  APARTMENTS                 D       3.93      0.20      0.200     75   11.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      8.81
  TOTAL AREA(ACRES) =       3.93   PEAK FLOW RATE(CFS) =       8.81

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  62
 ----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =    88.50  DOWNSTREAM ELEVATION(FEET) =    46.30
  STREET LENGTH(FEET) =   780.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  18.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   12.72
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.14
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.53
 STREET FLOW TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   13.52
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.296
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        2.23      0.20      0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     2.23      SUBAREA RUNOFF(CFS) =    4.57
 EFFECTIVE AREA(ACRES) =       6.16     AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =         6.2        PEAK FLOW RATE(CFS) =      12.55

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  13.41
 FLOW VELOCITY(FEET/SEC.) =  6.31   DEPTH*VELOCITY(FT*FT/SEC.) =    2.69
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       5.00 =    1633.00 FEET.

****************************************************************************
 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) =     41.67  DOWNSTREAM(FEET) =     26.71
 FLOW LENGTH(FEET) =    180.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.62
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.55
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.71
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       6.00 =    1813.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       6.00 TO NODE       6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.277
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.25      0.20      0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.25      SUBAREA RUNOFF(CFS) =    0.51
 EFFECTIVE AREA(ACRES) =       6.41   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =         6.4        PEAK FLOW RATE(CFS) =      12.95

****************************************************************************
 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) =     26.71  DOWNSTREAM(FEET) =     23.77
 FLOW LENGTH(FEET) =     38.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.20
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.95
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   13.75
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       7.00 =    1851.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.75
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.273
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.33      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.33      SUBAREA RUNOFF(CFS) =    0.62
 EFFECTIVE AREA(ACRES) =       6.74   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =         6.7        PEAK FLOW RATE(CFS) =      13.54

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       9.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     23.77  DOWNSTREAM(FEET) =     12.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   462.00   CHANNEL SLOPE =  0.0244
 CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    3.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.196
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.77      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.24
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.02
 AVERAGE FLOW DEPTH(FEET) =   1.26   TRAVEL TIME(MIN.) =   0.85
 Tc(MIN.) =   14.61
 SUBAREA AREA(ACRES) =      0.77        SUBAREA RUNOFF(CFS) =    1.38
 EFFECTIVE AREA(ACRES) =       7.51     AREA-AVERAGED Fm(INCH/HR) =   0.06
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.28
 TOTAL AREA(ACRES) =         7.5         PEAK FLOW RATE(CFS) =      14.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =   9.06
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      9.00 =    2313.50 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     27.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     12.50  DOWNSTREAM(FEET) =      9.76
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0043
 CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    3.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.027
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.55      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.91
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.78
 AVERAGE FLOW DEPTH(FEET) =   1.77   TRAVEL TIME(MIN.) =   2.20
 Tc(MIN.) =   16.81
 SUBAREA AREA(ACRES) =      0.55        SUBAREA RUNOFF(CFS) =    0.90
 EFFECTIVE AREA(ACRES) =       8.06     AREA-AVERAGED Fm(INCH/HR) =   0.07
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.33
 TOTAL AREA(ACRES) =         8.1         PEAK FLOW RATE(CFS) =      14.46
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.74   FLOW VELOCITY(FEET/SEC.) =   4.75
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE     27.00 =    2943.50 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  10
------------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
 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) =   312.00
 ELEVATION DATA: UPSTREAM(FEET) =     79.10  DOWNSTREAM(FEET) =     73.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.425
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.129
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        2.21      0.20      1.000     83   15.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       3.84
 TOTAL AREA(ACRES) =        2.21   PEAK FLOW RATE(CFS) =       3.84

******************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  51
------------------------------------------------------------------------------
```

```
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      73.00  DOWNSTREAM(FEET) =      46.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   312.00   CHANNEL SLOPE =  0.0849
 CHANNEL BASE(FEET) =      0.00    "Z" FACTOR =    1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    1.50
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.091
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =         4.09
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.55
 AVERAGE FLOW DEPTH(FEET) =    0.62    TRAVEL TIME(MIN.) =    0.49
 Tc(MIN.) =   15.92
 SUBAREA AREA(ACRES) =       0.30         SUBAREA RUNOFF(CFS) =     0.51
 EFFECTIVE AREA(ACRES) =         2.51      AREA-AVERAGED Fm(INCH/HR) =    0.20
 AREA-AVERAGED Fp(INCH/HR) =    0.20  AREA-AVERAGED Ap =    1.00
 TOTAL AREA(ACRES) =            2.5          PEAK FLOW RATE(CFS) =        4.27

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.64    FLOW VELOCITY(FEET/SEC.) =  10.56
 LONGEST FLOWPATH FROM NODE       10.00 TO NODE      13.00 =      624.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      13.00 TO NODE      25.00 IS CODE =  51
----------------------------------------------------------------------------

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      46.50  DOWNSTREAM(FEET) =      27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   758.00   CHANNEL SLOPE =  0.0257
 CHANNEL BASE(FEET) =      0.00    "Z" FACTOR =    1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    3.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.981
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        5.07      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =         8.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.05
 AVERAGE FLOW DEPTH(FEET) =    1.02    TRAVEL TIME(MIN.) =    1.57
 Tc(MIN.) =   17.49
 SUBAREA AREA(ACRES) =       5.07         SUBAREA RUNOFF(CFS) =     8.13
 EFFECTIVE AREA(ACRES) =         7.58      AREA-AVERAGED Fm(INCH/HR) =    0.20
 AREA-AVERAGED Fp(INCH/HR) =    0.20  AREA-AVERAGED Ap =    1.00
 TOTAL AREA(ACRES) =            7.6          PEAK FLOW RATE(CFS) =       12.15

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.17    FLOW VELOCITY(FEET/SEC.) =   8.84
 LONGEST FLOWPATH FROM NODE       10.00 TO NODE      25.00 =     1382.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  10
----------------------------------------------------------------------------

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      17.00 TO NODE      19.00 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) =      49.00  DOWNSTREAM(FEET) =      43.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.219
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.145
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.87      0.20      1.000     83   15.22
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =        1.52
 TOTAL AREA(ACRES) =        0.87    PEAK FLOW RATE(CFS) =        1.52

****************************************************************************
 FLOW PROCESS FROM NODE      19.00 TO NODE      25.00 IS CODE =  52
----------------------------------------------------------------------------

 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
>>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     43.20  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   325.00   CHANNEL SLOPE =  0.0498
 CHANNEL FLOW THRU SUBAREA(CFS) =        1.52
 FLOW VELOCITY(FEET/SEC) =   3.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   16.71
 LONGEST FLOWPATH FROM NODE      17.00 TO NODE      25.00 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   16.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.033
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         2.50     0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.50     SUBAREA RUNOFF(CFS) =     4.13
 EFFECTIVE AREA(ACRES) =       3.37   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =          3.4     PEAK FLOW RATE(CFS) =       5.56

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1        5.56   16.71     2.033  0.20( 0.20) 1.00        3.4       17.00
 LONGEST FLOWPATH FROM NODE      17.00 TO NODE      25.00 =     625.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       12.15   17.49     1.981  0.20( 0.20) 1.00        7.6       10.00
 LONGEST FLOWPATH FROM NODE      10.00 TO NODE      25.00 =    1382.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       17.51   16.71     2.033  0.20( 0.20) 1.00       10.6       17.00
     2       17.55   17.49     1.981  0.20( 0.20) 1.00       10.9       10.00
   TOTAL AREA(ACRES) =          10.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        17.55  Tc(MIN.) =   17.487
 EFFECTIVE AREA(ACRES) =       10.95  AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         10.9
 LONGEST FLOWPATH FROM NODE      10.00 TO NODE      25.00 =    1382.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
==========================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========================================================================

****************************************************************************
 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) =    408.00
 ELEVATION DATA: UPSTREAM(FEET) =     100.00  DOWNSTREAM(FEET) =      97.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     9.787
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
 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.)
 APARTMENTS                  D         2.94     0.20      0.200     75    9.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       7.20
```

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 TOTAL AREA(ACRES) =      2.94   PEAK FLOW RATE(CFS) =      7.20

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE = 81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.79
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D        3.00      0.20      0.200     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =     7.35
 EFFECTIVE AREA(ACRES) =       5.94   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =         5.9       PEAK FLOW RATE(CFS) =      14.56

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 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) =     90.70  DOWNSTREAM(FEET) =     44.32
 FLOW LENGTH(FEET) =  1567.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.89
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.56
 PIPE TRAVEL TIME(MIN.) =   2.40    Tc(MIN.) =   12.19
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =    1975.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE = 81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.19
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D       32.99      0.20      0.200     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =   32.99      SUBAREA RUNOFF(CFS) =    71.16
 EFFECTIVE AREA(ACRES) =      38.93   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        38.9       PEAK FLOW RATE(CFS) =      83.97

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE = 81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.19
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        2.00      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =     4.03
 EFFECTIVE AREA(ACRES) =      40.93   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =        40.9       PEAK FLOW RATE(CFS) =      87.99

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     25.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     44.32  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    561.00   CHANNEL SLOPE =  0.0309
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    3.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.370
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.30      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      89.26
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```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  15.59
  AVERAGE FLOW DEPTH(FEET) =   2.39   TRAVEL TIME(MIN.) =   0.60
  Tc(MIN.) =   12.79
  SUBAREA AREA(ACRES) =      1.30       SUBAREA RUNOFF(CFS) =     2.54
  EFFECTIVE AREA(ACRES) =      42.23     AREA-AVERAGED Fm(INCH/HR) =    0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.26
  TOTAL AREA(ACRES) =        42.2            PEAK FLOW RATE(CFS) =       88.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.38    FLOW VELOCITY(FEET/SEC.) =  15.51
  LONGEST FLOWPATH FROM NODE      20.00 TO NODE      25.00 =    2536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)     Ap     Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1        88.10   12.79    2.370  0.20( 0.05) 0.26       42.2       20.00
  LONGEST FLOWPATH FROM NODE      20.00 TO NODE      25.00 =    2536.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)     Ap     Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1        17.51   16.71    2.033  0.20( 0.20) 1.00       10.6       17.00
     2        17.55   17.49    1.981  0.20( 0.20) 1.00       10.9       10.00
  LONGEST FLOWPATH FROM NODE      10.00 TO NODE      25.00 =    1382.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc    Intensity   Fp(Fm)     Ap     Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       103.96   12.79    2.370  0.20( 0.08) 0.38       50.4       20.00
     2        92.80   16.71    2.033  0.20( 0.08) 0.41       52.8       17.00
     3        90.85   17.49    1.981  0.20( 0.08) 0.41       53.2       10.00
    TOTAL AREA(ACRES) =          53.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       103.96  Tc(MIN.) =    12.786
  EFFECTIVE AREA(ACRES) =      50.35  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =        53.2
  LONGEST FLOWPATH FROM NODE      20.00 TO NODE      25.00 =    2536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      27.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =       27.00  DOWNSTREAM(FEET) =       9.76
  CHANNEL LENGTH THRU SUBAREA(FEET) =    235.00   CHANNEL SLOPE =  0.0734
  CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =    1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =     3.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.352
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D         0.01      0.20     1.000     83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      103.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  22.40
  AVERAGE FLOW DEPTH(FEET) =   2.15   TRAVEL TIME(MIN.) =   0.17
  Tc(MIN.) =   12.96
  SUBAREA AREA(ACRES) =      0.01       SUBAREA RUNOFF(CFS) =     0.02
  EFFECTIVE AREA(ACRES) =      50.36     AREA-AVERAGED Fm(INCH/HR) =    0.08
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.38
  TOTAL AREA(ACRES) =        53.2            PEAK FLOW RATE(CFS) =      103.96
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.15    FLOW VELOCITY(FEET/SEC.) =  22.40
  LONGEST FLOWPATH FROM NODE      20.00 TO NODE      27.00 =    2771.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      27.00 TO NODE      27.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1      103.96   12.96    2.352  0.20( 0.08) 0.38       50.4       20.00
    2       92.80   16.89    2.021  0.20( 0.08) 0.41       52.9       17.00
    3       90.85   17.67    1.969  0.20( 0.08) 0.41       53.2       10.00
LONGEST FLOWPATH FROM NODE      20.00 TO NODE      27.00 =    2771.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       14.46   16.81    2.027  0.20( 0.07) 0.33        8.1        1.00
LONGEST FLOWPATH FROM NODE       1.00 TO NODE      27.00 =    2943.50 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1      116.96   12.96    2.352  0.20( 0.08) 0.38       56.6       20.00
    2      107.50   16.81    2.027  0.20( 0.08) 0.40       60.9        1.00
    3      107.22   16.89    2.021  0.20( 0.08) 0.40       60.9       17.00
    4      104.89   17.67    1.969  0.20( 0.08) 0.40       61.2       10.00
  TOTAL AREA(ACRES) =          61.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      116.96  Tc(MIN.) =    12.961
EFFECTIVE AREA(ACRES) =      56.58  AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
TOTAL AREA(ACRES) =        61.2
LONGEST FLOWPATH FROM NODE       1.00 TO NODE      27.00 =    2943.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE      27.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE      35.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =       9.76  DOWNSTREAM(FEET) =      0.76
 FLOW LENGTH(FEET) =    330.00    MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =   8.00    ESTIMATED BOX HEIGHT(FEET) =    1.24
 BOX-FLOW VELOCITY(FEET/SEC.) =  11.80
 BOX-FLOW(CFS) =     116.96
 BOX-FLOW TRAVEL TIME(MIN.) =   0.47     Tc(MIN.) =    13.43
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      35.00 =    3273.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      29.00 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) =    334.00
 ELEVATION DATA: UPSTREAM(FEET) =       69.70  DOWNSTREAM(FEET) =      67.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    20.084
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.830
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.52       0.20      1.000     83   20.08
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.23
 TOTAL AREA(ACRES) =       1.52    PEAK FLOW RATE(CFS) =       2.23

****************************************************************************
 FLOW PROCESS FROM NODE      31.00 TO NODE      33.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      67.70  DOWNSTREAM(FEET) =      10.64
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1124.00    CHANNEL SLOPE =  0.0508
 CHANNEL FLOW THRU SUBAREA(CFS) =         2.23
 FLOW VELOCITY(FEET/SEC) =    3.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =    4.72    Tc(MIN.) =    24.81
 LONGEST FLOWPATH FROM NODE      29.00 TO NODE      33.00 =    1458.00 FEET.

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

```
 FLOW PROCESS FROM NODE      33.00 TO NODE      33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.81
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.621
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       14.50      0.20     1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   14.50      SUBAREA RUNOFF(CFS) =    18.55
 EFFECTIVE AREA(ACRES) =      16.02   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.0       PEAK FLOW RATE(CFS) =       20.49

****************************************************************************
 FLOW PROCESS FROM NODE      33.00 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) =      1.37  DOWNSTREAM(FEET) =      0.76
 FLOW LENGTH(FEET) =     24.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.19
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       20.49
 PIPE TRAVEL TIME(MIN.) =    0.04     Tc(MIN.) =    24.84
 LONGEST FLOWPATH FROM NODE      29.00 TO NODE      35.00 =     1482.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1       20.49   24.84     1.620  0.20( 0.20) 1.00       16.0       29.00
 LONGEST FLOWPATH FROM NODE      29.00 TO NODE      35.00 =     1482.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1      116.96   13.43     2.305  0.20( 0.08) 0.38       56.6       20.00
     2      107.50   17.29     1.994  0.20( 0.08) 0.40       60.9        1.00
     3      107.22   17.37     1.989  0.20( 0.08) 0.40       60.9       17.00
     4      104.89   18.15     1.939  0.20( 0.08) 0.40       61.2       10.00
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      35.00 =     3273.50 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1      133.38   13.43     2.305  0.20( 0.09) 0.46       65.2       20.00
     2      125.52   17.29     1.994  0.20( 0.10) 0.49       72.0        1.00
     3      125.27   17.37     1.989  0.20( 0.10) 0.49       72.1       17.00
     4      123.23   18.15     1.939  0.20( 0.10) 0.50       73.0       10.00
     5      107.38   24.84     1.620  0.20( 0.11) 0.53       77.3       29.00
   TOTAL AREA(ACRES) =          77.3

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       133.38  Tc(MIN.) =    13.427
 EFFECTIVE AREA(ACRES) =      65.24  AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =        77.3
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      35.00 =     3273.50 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)       =       77.3  TC(MIN.) =      13.43
 EFFECTIVE AREA(ACRES) =      65.24  AREA-AVERAGED Fm(INCH/HR)=  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.459
 PEAK FLOW RATE(CFS)     =      133.38

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1      133.38   13.43     2.305  0.20( 0.09) 0.46       65.2       20.00
     2      125.52   17.29     1.994  0.20( 0.10) 0.49       72.0        1.00
     3      125.27   17.37     1.989  0.20( 0.10) 0.49       72.1       17.00
     4      123.23   18.15     1.939  0.20( 0.10) 0.50       73.0       10.00
     5      107.38   24.84     1.620  0.20( 0.11) 0.53       77.3       29.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS

0
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RATIONAL METHOD Q25 HYDROLOGY
-Existing Condition-

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********************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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          Ver. 15.0  Release Date: 04/01/2008  License ID 1585

                         Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
 * SUNSET RIDGE PARK                                                        *
 * EXISTING CONDITION HYDROLOGY - 25 YEAR EVENT                             *
 * INCLUDES OFFSITE RUNOFF FROM TRACT 7852, 7817, AND PORTION OF SUPERIOR   *
 **************************************************************************

  FILE NAME: 192-EX25.25
  TIME/DATE OF STUDY: 15:56 06/29/2009
-------------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------------
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY   (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== =====  =======
 1   36.0     18.0     0.020/0.020/0.020  0.67    2.00 0.0312 0.167 0.0150

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

*******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   853.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     88.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.402
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.025
  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.)
  APARTMENTS                 D        3.93     0.20      0.200     75   11.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     10.56
  TOTAL AREA(ACRES) =      3.93   PEAK FLOW RATE(CFS) =      10.56

*******************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  62
-------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
===============================================================================
  UPSTREAM ELEVATION(FEET) =    88.50  DOWNSTREAM ELEVATION(FEET) =    46.30
  STREET LENGTH(FEET) =   780.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  18.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   13.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.37
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.76
  STREET FLOW TRAVEL TIME(MIN.) =    2.04    Tc(MIN.) =   13.44
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.756
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   D        2.23       0.20      0.100     75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     2.23      SUBAREA RUNOFF(CFS) =     5.49
  EFFECTIVE AREA(ACRES) =       6.16     AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =          6.2        PEAK FLOW RATE(CFS) =      15.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45    HALFSTREET FLOOD WIDTH(FEET) =  14.47
  FLOW VELOCITY(FEET/SEC.) =  6.61    DEPTH*VELOCITY(FT*FT/SEC.) =   2.96
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE       5.00 =    1633.00 FEET.

****************************************************************************
  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) =    41.67  DOWNSTREAM(FEET) =    26.71
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.17
  ESTIMATED PIPE DIAMETER(INCH) =  15.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       15.10
  PIPE TRAVEL TIME(MIN.) =    0.19     Tc(MIN.) =   13.63
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE       6.00 =    1813.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE       6.00 TO NODE       6.00 IS CODE =  81
 ----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    13.63
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.735
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   D        0.25       0.20      0.100     75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.25      SUBAREA RUNOFF(CFS) =     0.61
  EFFECTIVE AREA(ACRES) =       6.41    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =          6.4        PEAK FLOW RATE(CFS) =      15.59

****************************************************************************
  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) =    26.71  DOWNSTREAM(FEET) =    23.77
  FLOW LENGTH(FEET) =    38.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.66
  ESTIMATED PIPE DIAMETER(INCH) =  15.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       15.59
  PIPE TRAVEL TIME(MIN.) =    0.04     Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE       7.00 =    1851.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 IS CODE =  81
 ----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    13.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.730
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        0.33       0.20      1.000     83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.33      SUBAREA RUNOFF(CFS) =     0.75
  EFFECTIVE AREA(ACRES) =       6.74    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =          6.7        PEAK FLOW RATE(CFS) =      16.32

****************************************************************************
  FLOW PROCESS FROM NODE       7.00 TO NODE       9.00 IS CODE =  51
 ----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     23.77  DOWNSTREAM(FEET) =     12.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   462.00   CHANNEL SLOPE =  0.0244
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.642
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.77      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.45
 AVERAGE FLOW DEPTH(FEET) =   1.35   TRAVEL TIME(MIN.) =   0.81
 Tc(MIN.) =   14.48
 SUBAREA AREA(ACRES) =     0.77        SUBAREA RUNOFF(CFS) =    1.69
 EFFECTIVE AREA(ACRES) =       7.51     AREA-AVERAGED Fm(INCH/HR) =    0.06
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.28
 TOTAL AREA(ACRES) =          7.5         PEAK FLOW RATE(CFS) =      17.47

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.36   FLOW VELOCITY(FEET/SEC.) =   9.51
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      9.00 =    2313.50 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE     27.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     12.50  DOWNSTREAM(FEET) =      9.76
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0043
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.448
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.55      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.01
 AVERAGE FLOW DEPTH(FEET) =   1.90   TRAVEL TIME(MIN.) =   2.10
 Tc(MIN.) =   16.58
 SUBAREA AREA(ACRES) =     0.55        SUBAREA RUNOFF(CFS) =    1.11
 EFFECTIVE AREA(ACRES) =       8.06     AREA-AVERAGED Fm(INCH/HR) =    0.07
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.33
 TOTAL AREA(ACRES) =          8.1         PEAK FLOW RATE(CFS) =      17.47
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.87   FLOW VELOCITY(FEET/SEC.) =   4.98
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE     27.00 =    2943.50 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE     27.00 IS CODE =  10
------------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
 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) =   312.00
 ELEVATION DATA: UPSTREAM(FEET) =     79.10  DOWNSTREAM(FEET) =     73.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.425
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.550
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.21      0.20      1.000     83   15.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      4.67
 TOTAL AREA(ACRES) =      2.21   PEAK FLOW RATE(CFS) =      4.67

******************************************************************************
 FLOW PROCESS FROM NODE      11.00 TO NODE     13.00 IS CODE =  51
------------------------------------------------------------------------------
```

```
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     73.00  DOWNSTREAM(FEET) =     46.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   312.00   CHANNEL SLOPE =  0.0849
CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    1.50
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                D        0.30      0.20      1.000     83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.98
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.15
AVERAGE FLOW DEPTH(FEET) =   0.67   TRAVEL TIME(MIN.) =   0.47
Tc(MIN.) =   15.89
SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =     0.62
EFFECTIVE AREA(ACRES) =       2.51     AREA-AVERAGED Fm(INCH/HR) =   0.20
AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =          2.5         PEAK FLOW RATE(CFS) =        5.21

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =  11.21
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     624.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE     13.00 TO NODE     25.00 IS CODE =  51
------------------------------------------------------------------------------

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     46.50  DOWNSTREAM(FEET) =     27.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   758.00   CHANNEL SLOPE =  0.0257
CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    3.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.383
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                D        5.07      0.20      1.000     83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.19
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.49
AVERAGE FLOW DEPTH(FEET) =   1.10   TRAVEL TIME(MIN.) =   1.49
Tc(MIN.) =   17.38
SUBAREA AREA(ACRES) =     5.07       SUBAREA RUNOFF(CFS) =     9.96
EFFECTIVE AREA(ACRES) =       7.58     AREA-AVERAGED Fm(INCH/HR) =   0.20
AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =          7.6         PEAK FLOW RATE(CFS) =       14.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =   9.33
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =    1382.00 FEET.

******************************************************************************
FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  10
------------------------------------------------------------------------------

>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

******************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 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) =     49.00  DOWNSTREAM(FEET) =     43.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.219
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.569
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                D        0.87      0.20      1.000     83   15.22
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =       1.85
TOTAL AREA(ACRES) =       0.87   PEAK FLOW RATE(CFS) =        1.85

******************************************************************************
FLOW PROCESS FROM NODE     19.00 TO NODE     25.00 IS CODE =  52
------------------------------------------------------------------------------

>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
>>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     43.20  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   325.00   CHANNEL SLOPE =  0.0498
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.85
 FLOW VELOCITY(FEET/SEC) =   3.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.43    Tc(MIN.) =   16.65
 LONGEST FLOWPATH FROM NODE      17.00 TO NODE      25.00 =    625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   16.65
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.442
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.50      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =      2.50     SUBAREA RUNOFF(CFS) =     5.04
 EFFECTIVE AREA(ACRES) =        3.37   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =           3.4       PEAK FLOW RATE(CFS) =       6.80

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1        6.80   16.65     2.442   0.20( 0.20) 1.00        3.4      17.00
 LONGEST FLOWPATH FROM NODE      17.00 TO NODE      25.00 =    625.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1       14.89   17.38     2.383   0.20( 0.20) 1.00        7.6      10.00
 LONGEST FLOWPATH FROM NODE      10.00 TO NODE      25.00 =   1382.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
     1       21.45   16.65     2.442   0.20( 0.20) 1.00       10.6      17.00
     2       21.51   17.38     2.383   0.20( 0.20) 1.00       10.9      10.00
   TOTAL AREA(ACRES) =          10.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        21.51  Tc(MIN.) =   17.380
 EFFECTIVE AREA(ACRES) =      10.95  AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         10.9
 LONGEST FLOWPATH FROM NODE      10.00 TO NODE      25.00 =   1382.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
==========================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========================================================================

****************************************************************************
 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) =    408.00
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     97.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     9.787
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
 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.)
 APARTMENTS                  D        2.94      0.20      0.200     75    9.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      8.62
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 TOTAL AREA(ACRES) =       2.94   PEAK FLOW RATE(CFS) =       8.62

****************************************************************************
 FLOW PROCESS FROM NODE      21.00 TO NODE      21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.79
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 APARTMENTS                  D        3.00       0.20      0.200     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     3.00       SUBAREA RUNOFF(CFS) =     8.80
 EFFECTIVE AREA(ACRES) =       5.94   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =         5.9       PEAK FLOW RATE(CFS) =      17.42

****************************************************************************
 FLOW PROCESS FROM NODE      21.00 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) =      90.70  DOWNSTREAM(FEET) =      44.32
 FLOW LENGTH(FEET) =  1567.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.54
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =       17.42
 PIPE TRAVEL TIME(MIN.) =    2.26      Tc(MIN.) =     12.05
 LONGEST FLOWPATH FROM NODE      20.00 TO NODE      23.00 =     1975.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      23.00 TO NODE      23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    12.05
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.932
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 APARTMENTS                  D       32.99       0.20      0.200     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    32.99       SUBAREA RUNOFF(CFS) =    85.86
 EFFECTIVE AREA(ACRES) =      38.93   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        38.9       PEAK FLOW RATE(CFS) =     101.32

****************************************************************************
 FLOW PROCESS FROM NODE      23.00 TO NODE      23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    12.05
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.932
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.00       0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.00       SUBAREA RUNOFF(CFS) =     4.92
 EFFECTIVE AREA(ACRES) =      40.93   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =        40.9       PEAK FLOW RATE(CFS) =     106.24

****************************************************************************
 FLOW PROCESS FROM NODE      23.00 TO NODE      25.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      44.32  DOWNSTREAM(FEET) =      27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =     561.00   CHANNEL SLOPE =  0.0309
 CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =    1.000
 MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) =     3.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.856
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.30       0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     107.79
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TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  16.34
AVERAGE FLOW DEPTH(FEET) =   2.57   TRAVEL TIME(MIN.) =   0.57
Tc(MIN.) =   12.62
SUBAREA AREA(ACRES) =      1.30        SUBAREA RUNOFF(CFS) =     3.11
EFFECTIVE AREA(ACRES) =     42.23      AREA-AVERAGED Fm(INCH/HR) =   0.05
AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.26
TOTAL AREA(ACRES) =        42.2          PEAK FLOW RATE(CFS) =     106.55

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.56   FLOW VELOCITY(FEET/SEC.) =  16.27
LONGEST FLOWPATH FROM NODE      20.00 TO NODE      25.00 =    2536.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM      Q       Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
  1      106.55   12.62    2.856  0.20( 0.05) 0.26      42.2       20.00
LONGEST FLOWPATH FROM NODE      20.00 TO NODE      25.00 =    2536.00 FEET.

** MEMORY BANK #  2 CONFLUENCE DATA **
STREAM      Q       Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
  1       21.45   16.65    2.442  0.20( 0.20) 1.00      10.6       17.00
  2       21.51   17.38    2.383  0.20( 0.20) 1.00      10.9       10.00
LONGEST FLOWPATH FROM NODE      10.00 TO NODE      25.00 =    1382.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q       Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
  1      125.82   12.62    2.856  0.20( 0.08) 0.38      50.3       20.00
  2      112.25   16.65    2.442  0.20( 0.08) 0.41      52.9       17.00
  3      110.09   17.38    2.383  0.20( 0.08) 0.41      53.2       10.00
  TOTAL AREA(ACRES) =          53.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       125.82  Tc(MIN.) =    12.623
EFFECTIVE AREA(ACRES) =      50.29  AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
TOTAL AREA(ACRES) =         53.2
LONGEST FLOWPATH FROM NODE      20.00 TO NODE      25.00 =    2536.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE      25.00 TO NODE      27.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      27.00  DOWNSTREAM(FEET) =       9.76
CHANNEL LENGTH THRU SUBAREA(FEET) =    235.00   CHANNEL SLOPE =  0.0734
CHANNEL BASE(FEET) =      0.00    "Z" FACTOR =    1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =     3.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.835
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"               D         0.01       0.20     1.000     83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     125.83
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  23.49
AVERAGE FLOW DEPTH(FEET) =   2.31   TRAVEL TIME(MIN.) =   0.17
Tc(MIN.) =   12.79
SUBAREA AREA(ACRES) =      0.01        SUBAREA RUNOFF(CFS) =     0.02
EFFECTIVE AREA(ACRES) =     50.30      AREA-AVERAGED Fm(INCH/HR) =   0.08
AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.38
TOTAL AREA(ACRES) =        53.2          PEAK FLOW RATE(CFS) =     125.82
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.31   FLOW VELOCITY(FEET/SEC.) =  23.49
LONGEST FLOWPATH FROM NODE      20.00 TO NODE      27.00 =    2771.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      27.00 TO NODE      27.00 IS CODE =  11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae    HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      125.82   12.79    2.835  0.20( 0.08) 0.38      50.3       20.00
    2      112.25   16.82    2.427  0.20( 0.08) 0.41      52.9       17.00
    3      110.09   17.55    2.370  0.20( 0.08) 0.41      53.2       10.00
LONGEST FLOWPATH FROM NODE      20.00 TO NODE      27.00 =    2771.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae    HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       17.47   16.58    2.448  0.20( 0.07) 0.33       8.1        1.00
LONGEST FLOWPATH FROM NODE       1.00 TO NODE      27.00 =    2943.50 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae    HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      141.49   12.79    2.835  0.20( 0.08) 0.38      56.5       20.00
    2      130.54   16.58    2.448  0.20( 0.08) 0.40      60.8        1.00
    3      129.58   16.82    2.427  0.20( 0.08) 0.40      60.9       17.00
    4      126.99   17.55    2.370  0.20( 0.08) 0.40      61.2       10.00
  TOTAL AREA(ACRES) =         61.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      141.49  Tc(MIN.) =    12.790
EFFECTIVE AREA(ACRES) =      56.52  AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
TOTAL AREA(ACRES) =       61.2
LONGEST FLOWPATH FROM NODE       1.00 TO NODE      27.00 =    2943.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE      27.00 IS CODE =  12
----------------------------------------------------------------------------

 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE      35.00 IS CODE =  36
----------------------------------------------------------------------------

 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      9.76  DOWNSTREAM(FEET) =      0.76
 FLOW LENGTH(FEET) =    330.00    MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =    8.00   ESTIMATED BOX HEIGHT(FEET) =    1.40
 BOX-FLOW VELOCITY(FEET/SEC.) =  12.64
 BOX-FLOW(CFS) =     141.49
 BOX-FLOW TRAVEL TIME(MIN.) =   0.44     Tc(MIN.) =    13.22
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      35.00 =    3273.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  10
----------------------------------------------------------------------------

 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      29.00 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) =    334.00
 ELEVATION DATA: UPSTREAM(FEET) =      69.70  DOWNSTREAM(FEET) =      67.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.084
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.196
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS    Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN   (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         1.52       0.20      1.000     83    20.08
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       2.73
 TOTAL AREA(ACRES) =        1.52   PEAK FLOW RATE(CFS) =       2.73

****************************************************************************
 FLOW PROCESS FROM NODE      31.00 TO NODE      33.00 IS CODE =  52
----------------------------------------------------------------------------

 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      67.70  DOWNSTREAM(FEET) =      10.64
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1124.00    CHANNEL SLOPE =  0.0508
 CHANNEL FLOW THRU SUBAREA(CFS) =        2.73
 FLOW VELOCITY(FEET/SEC) =    4.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =    4.52    Tc(MIN.) =    24.60
 LONGEST FLOWPATH FROM NODE      29.00 TO NODE      33.00 =    1458.00 FEET.

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

```
 FLOW PROCESS FROM NODE      33.00 TO NODE      33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    24.60
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.957
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        14.50      0.20      1.000      83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   14.50     SUBAREA RUNOFF(CFS) =    22.93
 EFFECTIVE AREA(ACRES) =      16.02    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        16.0       PEAK FLOW RATE(CFS) =       25.34

****************************************************************************
 FLOW PROCESS FROM NODE      33.00 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) =       1.37  DOWNSTREAM(FEET) =       0.76
 FLOW LENGTH(FEET) =     24.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.92
 ESTIMATED PIPE DIAMETER(INCH) =  24.00     NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =       25.34
 PIPE TRAVEL TIME(MIN.) =    0.03     Tc(MIN.) =    24.64
 LONGEST FLOWPATH FROM NODE      29.00 TO NODE      35.00 =     1482.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       25.34   24.64    1.956  0.20( 0.20) 1.00       16.0       29.00
  LONGEST FLOWPATH FROM NODE      29.00 TO NODE      35.00 =     1482.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      141.49   13.22    2.782  0.20( 0.08) 0.38       56.5       20.00
     2      130.54   17.03    2.411  0.20( 0.08) 0.40       60.8        1.00
     3      129.58   17.27    2.391  0.20( 0.08) 0.40       60.9       17.00
     4      126.99   18.00    2.336  0.20( 0.08) 0.40       61.2       10.00
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE      35.00 =     3273.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      161.48   13.22    2.782  0.20( 0.09) 0.46       65.1       20.00
     2      152.59   17.03    2.411  0.20( 0.10) 0.49       71.8        1.00
     3      151.74   17.27    2.391  0.20( 0.10) 0.49       72.2       17.00
     4      149.52   18.00    2.336  0.20( 0.10) 0.50       73.0       10.00
     5      130.93   24.64    1.956  0.20( 0.11) 0.53       77.3       29.00
    TOTAL AREA(ACRES) =          77.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       161.48  Tc(MIN.) =     13.225
  EFFECTIVE AREA(ACRES) =      65.12  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        77.3
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE      35.00 =     3273.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)        =       77.3  TC(MIN.) =      13.22
  EFFECTIVE AREA(ACRES) =      65.12  AREA-AVERAGED Fm(INCH/HR)=  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.458
  PEAK FLOW RATE(CFS)      =     161.48

  ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      161.48   13.22    2.782  0.20( 0.09) 0.46       65.1       20.00
     2      152.59   17.03    2.411  0.20( 0.10) 0.49       71.8        1.00
     3      151.74   17.27    2.391  0.20( 0.10) 0.49       72.2       17.00
     4      149.52   18.00    2.336  0.20( 0.10) 0.50       73.0       10.00
     5      130.93   24.64    1.956  0.20( 0.11) 0.53       77.3       29.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

RATIONAL METHOD Q10 HYDROLOGY
-Proposed Condition-

```
____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 15.0  Release Date: 04/01/2008  License ID 1585

                         Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
 * SUNSET RIDGE PARK                                                       *
 * PROPOSED CONDITION HYDROLOGY - 10 YEAR EVENT                            *
 * INCLUDES OFFSITE RUNOFF FROM TRACT 7852, 7817, AND PORTION OF SUPERIOR  *
 **************************************************************************

  FILE NAME: 192-PR10.10
  TIME/DATE OF STUDY: 22:03 07/01/2009
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE   FACTOR
NO.  (FT)    (FT)      SIDE / SIDE/ WAY   (FT)   (FT)   (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ======  =====  ======
 1   36.0    18.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   853.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     88.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.402
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.531
  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.)
  APARTMENTS                 D        3.93      0.20      0.200     75   11.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      8.81
  TOTAL AREA(ACRES) =      3.93   PEAK FLOW RATE(CFS) =      8.81

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =    88.50  DOWNSTREAM ELEVATION(FEET) =    46.30
  STREET LENGTH(FEET) =   780.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  18.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   12.72
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.14
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.53
 STREET FLOW TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   13.52
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.296
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        2.23      0.20     0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     2.23       SUBAREA RUNOFF(CFS) =     4.57
 EFFECTIVE AREA(ACRES) =        6.16    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =          6.2          PEAK FLOW RATE(CFS) =       12.55

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  13.41
 FLOW VELOCITY(FEET/SEC.) =  6.31   DEPTH*VELOCITY(FT*FT/SEC.) =    2.69
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       5.00 =    1633.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       5.00 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) =     41.67  DOWNSTREAM(FEET) =     26.71
 FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.62
 ESTIMATED PIPE DIAMETER(INCH) =  15.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.55
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.71
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       7.00 =    1813.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.277
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.25      0.20     0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.25       SUBAREA RUNOFF(CFS) =     0.51
 EFFECTIVE AREA(ACRES) =        6.41    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =          6.4          PEAK FLOW RATE(CFS) =       12.95

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       9.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     26.71  DOWNSTREAM(FEET) =     25.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.50
 ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.95
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.81
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       9.00 =    1873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE       9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.81
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.268
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        0.94      0.20     0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     0.94       SUBAREA RUNOFF(CFS) =     1.78
 EFFECTIVE AREA(ACRES) =        7.35    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =          7.3          PEAK FLOW RATE(CFS) =       14.68

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE      39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    25.00  DOWNSTREAM(FEET) =    10.60
 FLOW LENGTH(FEET) =  1064.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.14
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        14.68
 PIPE TRAVEL TIME(MIN.) =   2.18    Tc(MIN.) =   15.98
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE     39.00 =    2937.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   15.98
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.086
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        2.53      0.20      0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     2.53     SUBAREA RUNOFF(CFS) =     4.36
 EFFECTIVE AREA(ACRES) =       9.88   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =          9.9       PEAK FLOW RATE(CFS) =      17.83

******************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  10
------------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   680.00
 ELEVATION DATA: UPSTREAM(FEET) =     97.60  DOWNSTREAM(FEET) =     71.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.337
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.928
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.64      0.20      1.000     83   18.34
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =        2.55
 TOTAL AREA(ACRES) =       1.64   PEAK FLOW RATE(CFS) =       2.55

******************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     25.00 IS CODE =  31
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    66.00  DOWNSTREAM(FEET) =    41.00
 FLOW LENGTH(FEET) =   453.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.01
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =         2.55
 PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   19.18
 LONGEST FLOWPATH FROM NODE      11.00 TO NODE     25.00 =    1133.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  10
------------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

******************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   408.00
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     97.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.787
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
 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.)
APARTMENTS                  D        2.94      0.20      0.200     75     9.79
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) =      7.20
TOTAL AREA(ACRES) =      2.94   PEAK FLOW RATE(CFS) =       7.20

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE = 81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.79
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.763
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
APARTMENTS                  D        3.00      0.20      0.200     75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) =     3.00     SUBAREA RUNOFF(CFS) =      7.35
EFFECTIVE AREA(ACRES) =      5.94   AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =          5.9      PEAK FLOW RATE(CFS) =      14.56

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 IS CODE = 31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     90.70  DOWNSTREAM(FEET) =     44.32
FLOW LENGTH(FEET) =  1567.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.89
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      14.56
PIPE TRAVEL TIME(MIN.) =    2.40     Tc(MIN.) =    12.19
LONGEST FLOWPATH FROM NODE      15.00 TO NODE      19.00 =     1975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE = 81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   12.19
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
APARTMENTS                  D       32.99      0.20      0.200     75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA AREA(ACRES) =    32.99     SUBAREA RUNOFF(CFS) =     71.16
EFFECTIVE AREA(ACRES) =     38.93   AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =         38.9      PEAK FLOW RATE(CFS) =      83.97

****************************************************************************
FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE = 81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   12.19
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.437
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
PUBLIC PARK                 D        0.60      0.20      0.850     75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
SUBAREA AREA(ACRES) =     0.60     SUBAREA RUNOFF(CFS) =      1.22
EFFECTIVE AREA(ACRES) =     39.53   AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.21
TOTAL AREA(ACRES) =         39.5      PEAK FLOW RATE(CFS) =      85.19

****************************************************************************
FLOW PROCESS FROM NODE     19.00 TO NODE     25.00 IS CODE = 31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     44.32  DOWNSTREAM(FEET) =     41.00
FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      85.19
PIPE TRAVEL TIME(MIN.) =    0.14     Tc(MIN.) =    12.32
LONGEST FLOWPATH FROM NODE      15.00 TO NODE      25.00 =     2107.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
     1         85.19    12.32    2.421  0.20( 0.04) 0.21       39.5       15.00
  LONGEST FLOWPATH FROM NODE      15.00 TO NODE      25.00 =     2107.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
     1          2.55    19.18    1.879  0.20( 0.20) 1.00        1.6       11.00
  LONGEST FLOWPATH FROM NODE      11.00 TO NODE      25.00 =     1133.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
     1         87.36    12.32    2.421  0.20( 0.05) 0.23       40.6       15.00
     2         68.34    19.18    1.879  0.20( 0.05) 0.24       41.2       11.00
    TOTAL AREA(ACRES) =          41.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        87.36  Tc(MIN.) =    12.324
  EFFECTIVE AREA(ACRES) =      40.58  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        41.2
  LONGEST FLOWPATH FROM NODE      15.00 TO NODE      25.00 =     2107.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      21.00 TO NODE      23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    545.00
  ELEVATION DATA: UPSTREAM(FEET) =      72.00  DOWNSTREAM(FEET) =      49.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.131
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.312
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA        Fp           Ap       SCS   Tc
       LAND USE             GROUP    (ACRES)   (INCH/HR)   (DECIMAL)   CN   (MIN.)
  COMMERCIAL                 D          0.49       0.20       0.100     75    7.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =        1.45
  TOTAL AREA(ACRES) =       0.49   PEAK FLOW RATE(CFS) =       1.45

****************************************************************************
  FLOW PROCESS FROM NODE      23.00 TO NODE      25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      44.00  DOWNSTREAM(FEET) =      41.00
  FLOW LENGTH(FEET) =      14.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN    6.0 INCH PIPE IS    3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.05
  ESTIMATED PIPE DIAMETER(INCH) =    6.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =          1.45
  PIPE TRAVEL TIME(MIN.) =    0.02     Tc(MIN.) =     7.15
  LONGEST FLOWPATH FROM NODE      21.00 TO NODE      25.00 =      559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
     1          1.45     7.15    3.308  0.20( 0.02) 0.10        0.5       21.00
```

```
 LONGEST FLOWPATH FROM NODE      21.00 TO NODE       25.00 =      559.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity    Fp(Fm)        Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)              (ACRES)     NODE
     1       87.36   12.32     2.421  0.20( 0.05) 0.23         40.6        15.00
     2       68.34   19.18     1.879  0.20( 0.05) 0.24         41.2        11.00
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE       25.00 =     2107.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc    Intensity    Fp(Fm)        Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)              (ACRES)     NODE
     1       71.04    7.15     3.308  0.20( 0.05) 0.23         24.0        21.00
     2       88.42   12.32     2.421  0.20( 0.05) 0.23         41.1        15.00
     3       69.17   19.18     1.879  0.20( 0.05) 0.24         41.7        11.00
   TOTAL AREA(ACRES) =         41.7

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        88.42  Tc(MIN.) =    12.324
 EFFECTIVE AREA(ACRES) =      41.07  AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =       41.7
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE       25.00 =     2107.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       25.00 TO NODE       25.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE       25.00 TO NODE       25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.32
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.421
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp          Ap       SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         0.63      0.20      1.000      83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.63     SUBAREA RUNOFF(CFS) =      1.26
 EFFECTIVE AREA(ACRES) =      41.70   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =       42.3        PEAK FLOW RATE(CFS) =       89.06

****************************************************************************
 FLOW PROCESS FROM NODE       25.00 TO NODE       25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.32
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.421
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp          Ap       SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         0.91      0.20      1.000      83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.91     SUBAREA RUNOFF(CFS) =      1.82
 EFFECTIVE AREA(ACRES) =      42.61   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =       43.2        PEAK FLOW RATE(CFS) =       90.88

****************************************************************************
 FLOW PROCESS FROM NODE       25.00 TO NODE       37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     41.00  DOWNSTREAM(FEET) =     21.00
 FLOW LENGTH(FEET) =    384.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.39
 ESTIMATED PIPE DIAMETER(INCH) =  33.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        90.88
 PIPE TRAVEL TIME(MIN.) =    0.30     Tc(MIN.) =    12.62
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE       37.00 =     2491.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       37.00 TO NODE       37.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE       27.00 TO NODE       29.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   385.00
  ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =      53.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.441
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.007
  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.)
  PUBLIC PARK               D        1.66      0.20      0.850    75    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      4.24
  TOTAL AREA(ACRES) =      1.66   PEAK FLOW RATE(CFS) =       4.24

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     47.00  DOWNSTREAM(FEET) =      21.00
  FLOW LENGTH(FEET) =    850.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.85
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =    1
  PIPE-FLOW(CFS) =       4.24
  PIPE TRAVEL TIME(MIN.) =   1.31     Tc(MIN.) =     9.75
  LONGEST FLOWPATH FROM NODE     27.00 TO NODE     37.00 =    1235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =     9.75
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.769
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        4.76      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     4.76     SUBAREA RUNOFF(CFS) =     11.14
  EFFECTIVE AREA(ACRES) =       6.42   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =         6.4        PEAK FLOW RATE(CFS) =       15.02

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =     9.75
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.769
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        0.76      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     0.76     SUBAREA RUNOFF(CFS) =      1.78
  EFFECTIVE AREA(ACRES) =       7.18   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =         7.2        PEAK FLOW RATE(CFS) =       16.80

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =     9.75
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.769
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               D        1.05      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     1.05     SUBAREA RUNOFF(CFS) =      2.46
  EFFECTIVE AREA(ACRES) =       8.23   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =         8.2        PEAK FLOW RATE(CFS) =       19.25

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1       19.25    9.75    2.769  0.20( 0.17) 0.85        8.2       27.00
 LONGEST FLOWPATH FROM NODE      27.00 TO NODE      37.00 =    1235.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1       74.86    7.46    3.227  0.20( 0.05) 0.27       25.6       21.00
     2       90.88   12.62    2.388  0.20( 0.05) 0.26       42.6       15.00
     3       70.99   19.49    1.862  0.20( 0.05) 0.27       43.2       11.00
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      37.00 =    2491.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1       92.19    7.46    3.227  0.20( 0.08) 0.39       31.9       21.00
     2      101.20    9.75    2.769  0.20( 0.08) 0.38       41.3       27.00
     3      107.31   12.62    2.388  0.20( 0.07) 0.35       50.8       15.00
     4       83.52   19.49    1.862  0.20( 0.07) 0.36       51.4       11.00
   TOTAL AREA(ACRES) =          51.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       107.31  Tc(MIN.) =    12.624
 EFFECTIVE AREA(ACRES) =      50.84  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       51.4
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      37.00 =    2491.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      31.00 TO NODE      33.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    125.00
 ELEVATION DATA: UPSTREAM(FEET) =      49.70  DOWNSTREAM(FEET) =       47.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D         0.74      0.20      0.100    75    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       2.69
 TOTAL AREA(ACRES) =        0.74   PEAK FLOW RATE(CFS) =        2.69

****************************************************************************
 FLOW PROCESS FROM NODE      33.00 TO NODE      35.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      47.20  DOWNSTREAM(FEET) =       27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    295.00   CHANNEL SLOPE =  0.0685
 CHANNEL BASE(FEET) =    12.00    "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =    1.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.289
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D         0.18      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        2.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    2.22
 AVERAGE FLOW DEPTH(FEET) =    0.10   TRAVEL TIME(MIN.) =    2.22
 Tc(MIN.) =     7.22
 SUBAREA AREA(ACRES) =       0.18        SUBAREA RUNOFF(CFS) =      0.51
 EFFECTIVE AREA(ACRES) =        0.92    AREA-AVERAGED Fm(INCH/HR) =    0.05
 AREA-AVERAGED Fp(INCH/HR) =    0.20  AREA-AVERAGED Ap =    0.25
 TOTAL AREA(ACRES) =            0.9        PEAK FLOW RATE(CFS) =          2.69
```

```
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.20
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      35.00 =     420.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.289
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        0.69       0.20      0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     0.69     SUBAREA RUNOFF(CFS) =      1.94
 EFFECTIVE AREA(ACRES) =       1.61   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.51
 TOTAL AREA(ACRES) =         1.6       PEAK FLOW RATE(CFS) =       4.62

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     22.00  DOWNSTREAM(FEET) =     21.00
 FLOW LENGTH(FEET) =     25.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS    7.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.26
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        4.62
 PIPE TRAVEL TIME(MIN.) =    0.05     Tc(MIN.) =      7.26
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      37.00 =     445.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q        Tc    Intensity   Fp(Fm)       Ap       Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)              (ACRES)     NODE
     1        4.62     7.26     3.277  0.20( 0.10) 0.51         1.6        31.00
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      37.00 =     445.00 FEET.

 ** MEMORY BANK #   2 CONFLUENCE DATA **
  STREAM       Q        Tc    Intensity   Fp(Fm)       Ap       Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)              (ACRES)     NODE
     1       92.19     7.46     3.227  0.20( 0.08) 0.39        31.9        21.00
     2      101.20     9.75     2.769  0.20( 0.08) 0.38        41.3        27.00
     3      107.31    12.62     2.388  0.20( 0.07) 0.35        50.8        15.00
     4       83.52    19.49     1.862  0.20( 0.07) 0.36        51.4        11.00
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      37.00 =    2491.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q        Tc    Intensity   Fp(Fm)       Ap       Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)              (ACRES)     NODE
     1       95.78     7.26     3.277  0.20( 0.08) 0.39        32.6        31.00
     2       96.74     7.46     3.227  0.20( 0.08) 0.39        33.5        21.00
     3      105.08     9.75     2.769  0.20( 0.08) 0.39        43.0        27.00
     4      110.63    12.62     2.388  0.20( 0.07) 0.36        52.5        15.00
     5       86.08    19.49     1.862  0.20( 0.07) 0.36        53.0        11.00
   TOTAL AREA(ACRES) =            53.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      110.63  Tc(MIN.) =    12.624
 EFFECTIVE AREA(ACRES) =      52.45  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =        53.0
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      37.00 =    2491.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     10.60
 FLOW LENGTH(FEET) =    209.00    MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.48
 ESTIMATED PIPE DIAMETER(INCH) =  33.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      110.63
 PIPE TRAVEL TIME(MIN.) =    0.16     Tc(MIN.) =    12.79
 LONGEST FLOWPATH FROM NODE       15.00 TO NODE       39.00 =    2700.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       39.00 TO NODE       39.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q       Tc     Intensity   Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)            (ACRES)    NODE
     1       95.78     7.43     3.236   0.20( 0.08) 0.39        32.6       31.00
     2       96.74     7.63     3.187   0.20( 0.08) 0.39        33.5       21.00
     3      105.08     9.91     2.743   0.20( 0.08) 0.39        43.0       27.00
     4      110.63    12.79     2.370   0.20( 0.07) 0.36        52.5       15.00
     5       86.08    19.67     1.852   0.20( 0.07) 0.36        53.0       11.00
 LONGEST FLOWPATH FROM NODE       15.00 TO NODE       39.00 =    2700.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q       Tc     Intensity   Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)            (ACRES)    NODE
     1       17.83    15.98     2.086   0.20( 0.08) 0.40         9.9        1.00
 LONGEST FLOWPATH FROM NODE        1.00 TO NODE       39.00 =    2937.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc     Intensity   Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)            (ACRES)    NODE
     1      108.82     7.43     3.236   0.20( 0.08) 0.40        37.2       31.00
     2      109.92     7.63     3.187   0.20( 0.08) 0.39        38.2       21.00
     3      119.76     9.91     2.743   0.20( 0.08) 0.39        49.1       27.00
     4      126.92    12.79     2.370   0.20( 0.07) 0.36        60.4       15.00
     5      117.05    15.98     2.086   0.20( 0.07) 0.37        62.6        1.00
     6      101.83    19.67     1.852   0.20( 0.07) 0.37        62.9       11.00
   TOTAL AREA(ACRES) =            62.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       126.92  Tc(MIN.) =    12.786
 EFFECTIVE AREA(ACRES) =      60.36  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =          62.9
 LONGEST FLOWPATH FROM NODE        1.00 TO NODE       39.00 =    2937.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       39.00 TO NODE       39.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE       39.00 TO NODE       55.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      10.60  DOWNSTREAM(FEET) =       0.82
 FLOW LENGTH(FEET) =    370.00    MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =    8.00    ESTIMATED BOX HEIGHT(FEET) =     1.32
 BOX-FLOW VELOCITY(FEET/SEC.) =  12.05
 BOX-FLOW(CFS) =      126.92
 BOX-FLOW TRAVEL TIME(MIN.) =    0.51     Tc(MIN.) =    13.30
 LONGEST FLOWPATH FROM NODE        1.00 TO NODE       55.00 =    3307.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       55.00 TO NODE       55.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE       41.00 TO NODE       43.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    260.00
 ELEVATION DATA: UPSTREAM(FEET) =      72.00  DOWNSTREAM(FEET) =      55.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     5.000
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =   4.060
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL   AREA       Fp         Ap       SCS   Tc
      LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)   CN   (MIN.)
 COMMERCIAL                D        0.25       0.20      0.100     75     5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
 SUBAREA RUNOFF(CFS) =       0.91
 TOTAL AREA(ACRES) =       0.25   PEAK FLOW RATE(CFS) =      0.91

****************************************************************************
 FLOW PROCESS FROM NODE      43.00 TO NODE      45.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      55.00  DOWNSTREAM(FEET) =      52.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =     10.00   CHANNEL SLOPE =  0.3000
 CHANNEL BASE(FEET) =     3.50    "Z" FACTOR =    0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    0.50
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.049
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30       0.20       1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        1.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    7.25
 AVERAGE FLOW DEPTH(FEET) =    0.06   TRAVEL TIME(MIN.) =    0.02
 Tc(MIN.) =     5.02
 SUBAREA AREA(ACRES) =       0.30        SUBAREA RUNOFF(CFS) =      1.04
 EFFECTIVE AREA(ACRES) =        0.55      AREA-AVERAGED Fm(INCH/HR) =     0.12
 AREA-AVERAGED Fp(INCH/HR) =    0.20  AREA-AVERAGED Ap =    0.59
 TOTAL AREA(ACRES) =          0.6          PEAK FLOW RATE(CFS) =        1.95

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.07    FLOW VELOCITY(FEET/SEC.) =    8.45
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      45.00 =      270.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      45.00 TO NODE      47.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      52.00  DOWNSTREAM(FEET) =      32.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    250.00   CHANNEL SLOPE =  0.0800
 CHANNEL BASE(FEET) =     2.00    "Z" FACTOR =    2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =    3.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.684
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.46       0.20       1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        2.67
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    4.63
 AVERAGE FLOW DEPTH(FEET) =    0.23   TRAVEL TIME(MIN.) =    0.90
 Tc(MIN.) =     5.92
 SUBAREA AREA(ACRES) =       0.46        SUBAREA RUNOFF(CFS) =      1.44
 EFFECTIVE AREA(ACRES) =        1.01      AREA-AVERAGED Fm(INCH/HR) =     0.16
 AREA-AVERAGED Fp(INCH/HR) =    0.20  AREA-AVERAGED Ap =    0.78
 TOTAL AREA(ACRES) =          1.0          PEAK FLOW RATE(CFS) =        3.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.26    FLOW VELOCITY(FEET/SEC.) =    4.84
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      47.00 =      520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      47.00 TO NODE      47.00 IS CODE = 81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     5.92
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.684
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  D        0.23       0.20       0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =       0.23       SUBAREA RUNOFF(CFS) =      0.76
 EFFECTIVE AREA(ACRES) =        1.24    AREA-AVERAGED Fm(INCH/HR) =   0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =   0.65
 TOTAL AREA(ACRES) =          1.2         PEAK FLOW RATE(CFS) =        3.97

****************************************************************************
 FLOW PROCESS FROM NODE      47.00 TO NODE      49.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      32.00  DOWNSTREAM(FEET) =      12.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    250.00   CHANNEL SLOPE =  0.0800
```

```
CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =    3.00
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                 D        0.42       0.20      1.000     83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        4.58
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.47
AVERAGE FLOW DEPTH(FEET) =    0.32   TRAVEL TIME(MIN.) =    0.76
Tc(MIN.) =    6.69
SUBAREA AREA(ACRES) =      0.42        SUBAREA RUNOFF(CFS) =      1.22
EFFECTIVE AREA(ACRES) =        1.66     AREA-AVERAGED Fm(INCH/HR) =    0.15
AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.74
TOTAL AREA(ACRES) =          1.7          PEAK FLOW RATE(CFS) =        4.91

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =    5.58
LONGEST FLOWPATH FROM NODE      41.00 TO NODE      49.00 =      770.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      49.00 TO NODE      49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =     6.69
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
COMMERCIAL                   D        0.22       0.20      0.100     75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =     0.22        SUBAREA RUNOFF(CFS) =     0.68
EFFECTIVE AREA(ACRES) =        1.88   AREA-AVERAGED Fm(INCH/HR) =  0.13
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
TOTAL AREA(ACRES) =          1.9         PEAK FLOW RATE(CFS) =        5.59

****************************************************************************
  FLOW PROCESS FROM NODE      49.00 TO NODE      51.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =      12.00  DOWNSTREAM(FEET) =       1.90
CHANNEL LENGTH THRU SUBAREA(FEET) =    125.00   CHANNEL SLOPE =  0.0808
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =  10.00
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.344
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
PUBLIC PARK                  D        0.54       0.20      0.850     75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        6.36
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    6.37
AVERAGE FLOW DEPTH(FEET) =    0.19   TRAVEL TIME(MIN.) =    0.33
Tc(MIN.) =    7.01
SUBAREA AREA(ACRES) =      0.54        SUBAREA RUNOFF(CFS) =      1.54
EFFECTIVE AREA(ACRES) =        2.42     AREA-AVERAGED Fm(INCH/HR) =    0.14
AREA-AVERAGED Fp(INCH/HR) =    0.20  AREA-AVERAGED Ap =    0.71
TOTAL AREA(ACRES) =          2.4          PEAK FLOW RATE(CFS) =        6.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =    6.69
LONGEST FLOWPATH FROM NODE      41.00 TO NODE      51.00 =      895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      51.00 TO NODE      51.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =     7.01
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.344
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                 D        2.88       0.20      1.000     83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     2.88        SUBAREA RUNOFF(CFS) =     8.15
EFFECTIVE AREA(ACRES) =        5.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.87
TOTAL AREA(ACRES) =          5.3         PEAK FLOW RATE(CFS) =       15.13

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

```
 FLOW PROCESS FROM NODE      51.00 TO NODE      53.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      1.90  DOWNSTREAM(FEET) =      1.35
 FLOW LENGTH(FEET) =     27.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.66
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       15.13
 PIPE TRAVEL TIME(MIN.) =   0.05     Tc(MIN.) =     7.06
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      53.00 =      922.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      53.00 TO NODE      53.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     7.06
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.332
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.11      0.20      0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.11      SUBAREA RUNOFF(CFS) =      0.33
 EFFECTIVE AREA(ACRES) =        5.41    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =         5.4       PEAK FLOW RATE(CFS) =       15.39

****************************************************************************
 FLOW PROCESS FROM NODE      53.00 TO NODE      55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      1.35  DOWNSTREAM(FEET) =      0.82
 FLOW LENGTH(FEET) =     35.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.60
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       15.39
 PIPE TRAVEL TIME(MIN.) =   0.07     Tc(MIN.) =     7.13
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      55.00 =      957.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      55.00 TO NODE      55.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)     Ap       Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       15.39    7.13     3.313  0.20( 0.17) 0.85       5.4       41.00
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      55.00 =      957.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)     Ap       Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1      108.82    7.97     3.108  0.20( 0.08) 0.40      37.2       31.00
    2      109.92    8.17     3.065  0.20( 0.08) 0.39      38.2       21.00
    3      119.76   10.43     2.663  0.20( 0.08) 0.39      49.1       27.00
    4      126.92   13.30     2.318  0.20( 0.07) 0.36      60.4       15.00
    5      117.05   16.51     2.047  0.20( 0.07) 0.37      62.6        1.00
    6      101.83   20.22     1.823  0.20( 0.07) 0.37      62.9       11.00
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      55.00 =     3307.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM       Q       Tc    Intensity   Fp(Fm)     Ap       Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1      119.31    7.13     3.313  0.20( 0.09) 0.46      38.7       41.00
    2      123.21    7.97     3.108  0.20( 0.09) 0.45      42.6       31.00
    3      124.10    8.17     3.065  0.20( 0.09) 0.45      43.6       21.00
    4      131.97   10.43     2.663  0.20( 0.09) 0.44      54.5       27.00
    5      137.44   13.30     2.318  0.20( 0.08) 0.40      65.8       15.00
    6      126.24   16.51     2.047  0.20( 0.08) 0.41      68.0        1.00
    7      109.92   20.22     1.823  0.20( 0.08) 0.41      68.3       11.00
   TOTAL AREA(ACRES) =            68.3

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       137.44  Tc(MIN.) =    13.298
 EFFECTIVE AREA(ACRES) =       65.77  AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =         68.3
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      55.00 =     3307.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      55.00 TO NODE      55.00 IS CODE =  12
```

```
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      55.00 TO NODE      67.00 IS CODE =  36
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      0.82  DOWNSTREAM(FEET) =      0.76
  FLOW LENGTH(FEET) =     34.00   MANNING'S N =  0.013
  *GIVEN BOX BASEWIDTH(FEET) =  11.00   ESTIMATED BOX HEIGHT(FEET) =     2.64
  BOX-FLOW VELOCITY(FEET/SEC.) =    4.74
  BOX-FLOW(CFS) =      137.44
  BOX-FLOW TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.42
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE      67.00 =    3341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      57.00 TO NODE      59.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     69.70  DOWNSTREAM(FEET) =     67.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.939
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.838
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.47      0.20      1.000     83   19.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       2.17
  TOTAL AREA(ACRES) =       1.47   PEAK FLOW RATE(CFS) =       2.17

****************************************************************************
  FLOW PROCESS FROM NODE      59.00 TO NODE      61.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     67.70  DOWNSTREAM(FEET) =     37.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0465
  CHANNEL FLOW THRU SUBAREA(CFS) =        2.17
  FLOW VELOCITY(FEET/SEC) =    3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =   22.85
  LONGEST FLOWPATH FROM NODE      57.00 TO NODE      61.00 =     990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      61.00 TO NODE      61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.699
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        3.46      0.20      1.000     83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =      3.46      SUBAREA RUNOFF(CFS) =     4.67
  EFFECTIVE AREA(ACRES) =       4.93    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =          4.9       PEAK FLOW RATE(CFS) =        6.65

****************************************************************************
  FLOW PROCESS FROM NODE      61.00 TO NODE      63.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     35.00
  FLOW LENGTH(FEET) =     80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS    9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =    8.51
  ESTIMATED PIPE DIAMETER(INCH) =  15.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        6.65
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   23.01
```

```
 LONGEST FLOWPATH FROM NODE      57.00 TO NODE      63.00 =    1070.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      63.00 TO NODE      65.00 IS CODE =  52
----------------------------------------------------------------------------

 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      35.00  DOWNSTREAM(FEET) =      10.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    406.00    CHANNEL SLOPE =  0.0616
 CHANNEL FLOW THRU SUBAREA(CFS) =        6.65
 FLOW VELOCITY(FEET/SEC) =   5.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.21    Tc(MIN.) =   24.22
 LONGEST FLOWPATH FROM NODE      57.00 TO NODE      65.00 =    1476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      65.00 TO NODE      65.00 IS CODE =  81
----------------------------------------------------------------------------

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.644
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D          4.04      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =      4.04      SUBAREA RUNOFF(CFS) =      5.25
 EFFECTIVE AREA(ACRES) =        8.97   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         9.0       PEAK FLOW RATE(CFS) =      11.66

****************************************************************************
 FLOW PROCESS FROM NODE      65.00 TO NODE      67.00 IS CODE =  31
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =       1.90  DOWNSTREAM(FEET) =       0.76
 FLOW LENGTH(FEET) =     70.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
 ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =       11.66
 PIPE TRAVEL TIME(MIN.) =    0.14     Tc(MIN.) =    24.36
 LONGEST FLOWPATH FROM NODE      57.00 TO NODE      67.00 =    1546.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =  11
----------------------------------------------------------------------------

 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.66	24.36	1.638	0.20(0.20)	1.00	9.0	57.00

LONGEST FLOWPATH FROM NODE 57.00 TO NODE 67.00 = 1546.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	119.31	7.25	3.280	0.20(0.09)	0.46	38.7	41.00
2	123.21	8.09	3.081	0.20(0.09)	0.45	42.6	31.00
3	124.10	8.29	3.038	0.20(0.09)	0.45	43.6	21.00
4	131.97	10.55	2.646	0.20(0.09)	0.44	54.5	27.00
5	137.44	13.42	2.306	0.20(0.08)	0.40	65.8	15.00
6	126.24	16.63	2.039	0.20(0.08)	0.41	68.0	1.00
7	109.92	20.35	1.816	0.20(0.08)	0.41	68.3	11.00

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 67.00 = 3341.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	126.75	7.25	3.280	0.20(0.10)	0.49	41.4	41.00
2	130.97	8.09	3.081	0.20(0.10)	0.49	45.6	31.00
3	131.93	8.29	3.038	0.20(0.10)	0.49	46.7	21.00
4	140.55	10.55	2.646	0.20(0.09)	0.47	58.4	27.00
5	146.84	13.42	2.306	0.20(0.09)	0.45	70.7	15.00
6	136.42	16.63	2.039	0.20(0.09)	0.45	74.1	1.00
7	120.87	20.35	1.816	0.20(0.09)	0.47	75.8	11.00
8	110.31	24.36	1.638	0.20(0.10)	0.48	77.3	57.00

TOTAL AREA(ACRES) = 77.3

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       146.84   Tc(MIN.) =    13.417
 EFFECTIVE AREA(ACRES) =       70.71   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =         77.3
```

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 67.00 = 3341.00 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 77.3 TC(MIN.) = 13.42
EFFECTIVE AREA(ACRES) = 70.71 AREA-AVERAGED Fm(INCH/HR)= 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.445
PEAK FLOW RATE(CFS) = 146.84

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	126.75	7.25	3.280	0.20(0.10)	0.49	41.4	41.00
2	130.97	8.09	3.081	0.20(0.10)	0.49	45.6	31.00
3	131.93	8.29	3.038	0.20(0.10)	0.49	46.7	21.00
4	140.55	10.55	2.646	0.20(0.09)	0.47	58.4	27.00
5	146.84	13.42	2.306	0.20(0.09)	0.45	70.7	15.00
6	136.42	16.63	2.039	0.20(0.09)	0.45	74.1	1.00
7	120.87	20.35	1.816	0.20(0.09)	0.47	75.8	11.00
8	110.31	24.36	1.638	0.20(0.10)	0.48	77.3	57.00

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD Q25 HYDROLOGY
-Proposed Condition-

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
       (c) Copyright 1983-2008 Advanced Engineering Software (aes)
          Ver. 15.0  Release Date: 04/01/2008  License ID 1585

                        Analysis prepared by:



************************** DESCRIPTION OF STUDY **************************
* SUNSET RIDGE PARK                                                        *
* PROPOSED CONDITION HYDROLOGY - 25 YEAR EVENT                             *
* INCLUDES OFFSITE RUNOFF FROM TRACT 7852, 7817, AND PORTION OF SUPERIOR   *
**************************************************************************

  FILE NAME: 192-PR25.25
  TIME/DATE OF STUDY: 22:07 07/01/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
                  --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
 1    36.0     18.0    0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
----------------------------------------------------------------------------

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   853.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     88.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.402
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.025
  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.)
  APARTMENTS                 D        3.93      0.20     0.200     75   11.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     10.56
  TOTAL AREA(ACRES) =      3.93   PEAK FLOW RATE(CFS) =     10.56

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  62
----------------------------------------------------------------------------

  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =    88.50  DOWNSTREAM ELEVATION(FEET) =    46.30
  STREET LENGTH(FEET) =   780.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  18.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       13.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   13.78
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.37
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     2.76
 STREET FLOW TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   13.44
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.756
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        2.23       0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     2.23       SUBAREA RUNOFF(CFS) =    5.49
 EFFECTIVE AREA(ACRES) =        6.16    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =          6.2        PEAK FLOW RATE(CFS) =       15.10

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45    HALFSTREET FLOOD WIDTH(FEET) =  14.47
 FLOW VELOCITY(FEET/SEC.) =  6.61    DEPTH*VELOCITY(FT*FT/SEC.) =    2.96
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       5.00 =    1633.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       5.00 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) =    41.67  DOWNSTREAM(FEET) =    26.71
 FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.17
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.10
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.63
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       7.00 =    1813.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.63
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.735
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.25       0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.25       SUBAREA RUNOFF(CFS) =    0.61
 EFFECTIVE AREA(ACRES) =        6.41    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =          6.4        PEAK FLOW RATE(CFS) =       15.59

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       9.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    26.71  DOWNSTREAM(FEET) =    25.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.59
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.72
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE       9.00 =    1873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE       9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.72
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.724
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        0.94       0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     0.94       SUBAREA RUNOFF(CFS) =    2.16
 EFFECTIVE AREA(ACRES) =        7.35    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =          7.3        PEAK FLOW RATE(CFS) =       17.69

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE      39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    25.00  DOWNSTREAM(FEET) =    10.60
 FLOW LENGTH(FEET) =  1064.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.62
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.69
 PIPE TRAVEL TIME(MIN.) =   2.06    Tc(MIN.) =   15.78
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     39.00 =    2937.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   15.78
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.517
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                D        2.53      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     2.53      SUBAREA RUNOFF(CFS) =     5.34
 EFFECTIVE AREA(ACRES) =       9.88   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =         9.9       PEAK FLOW RATE(CFS) =      21.67

**************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   680.00
 ELEVATION DATA: UPSTREAM(FEET) =     97.60  DOWNSTREAM(FEET) =     71.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.337
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.312
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.64      0.20      1.000    83   18.34
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.12
 TOTAL AREA(ACRES) =       1.64   PEAK FLOW RATE(CFS) =      3.12

**************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     25.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    66.00  DOWNSTREAM(FEET) =    41.00
 FLOW LENGTH(FEET) =   453.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.35
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.12
 PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =   19.14
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     25.00 =    1133.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   408.00
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     97.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.787
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
 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.)
 APARTMENTS                  D        2.94       0.20      0.200    75    9.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      8.62
 TOTAL AREA(ACRES) =        2.94   PEAK FLOW RATE(CFS) =       8.62

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                  D        3.00       0.20      0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =     8.80
 EFFECTIVE AREA(ACRES) =       5.94   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =          5.9       PEAK FLOW RATE(CFS) =      17.42

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     90.70  DOWNSTREAM(FEET) =     44.32
 FLOW LENGTH(FEET) =  1567.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.54
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       17.42
 PIPE TRAVEL TIME(MIN.) =    2.26     Tc(MIN.) =    12.05
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      19.00 =    1975.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.05
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.932
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                  D       32.99       0.20      0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =   32.99      SUBAREA RUNOFF(CFS) =    85.86
 EFFECTIVE AREA(ACRES) =      38.93   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =         38.9       PEAK FLOW RATE(CFS) =     101.32

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.05
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.932
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        0.60       0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =     1.49
 EFFECTIVE AREA(ACRES) =      39.53   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.21
 TOTAL AREA(ACRES) =         39.5       PEAK FLOW RATE(CFS) =     102.81

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     44.32  DOWNSTREAM(FEET) =     41.00
 FLOW LENGTH(FEET) =   132.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.74
 ESTIMATED PIPE DIAMETER(INCH) =  39.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      102.81
 PIPE TRAVEL TIME(MIN.) =    0.13     Tc(MIN.) =    12.18
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      25.00 =    2107.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      102.81   12.18     2.914  0.20( 0.04) 0.21      39.5       15.00
  LONGEST FLOWPATH FROM NODE      15.00 TO NODE      25.00 =    2107.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1        3.12   19.14     2.256  0.20( 0.20) 1.00       1.6       11.00
  LONGEST FLOWPATH FROM NODE      11.00 TO NODE      25.00 =    1133.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      105.43   12.18     2.914  0.20( 0.05) 0.23      40.6       15.00
      2       82.38   19.14     2.256  0.20( 0.05) 0.24      41.2       11.00
    TOTAL AREA(ACRES) =         41.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       105.43  Tc(MIN.) =    12.182
  EFFECTIVE AREA(ACRES) =      40.57  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        41.2
  LONGEST FLOWPATH FROM NODE      15.00 TO NODE      25.00 =    2107.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      21.00 TO NODE      23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    545.00
  ELEVATION DATA: UPSTREAM(FEET) =      72.00  DOWNSTREAM(FEET) =      49.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.131
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp          Ap       SCS   Tc
       LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)    CN  (MIN.)
  COMMERCIAL                  D        0.49       0.20      0.100      75    7.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =       1.73
  TOTAL AREA(ACRES) =       0.49   PEAK FLOW RATE(CFS) =       1.73

****************************************************************************
  FLOW PROCESS FROM NODE      23.00 TO NODE      25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      44.00  DOWNSTREAM(FEET) =      41.00
  FLOW LENGTH(FEET) =      14.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN    6.0 INCH PIPE IS    3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.59
  ESTIMATED PIPE DIAMETER(INCH) =    6.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1.73
  PIPE TRAVEL TIME(MIN.) =    0.02     Tc(MIN.) =      7.15
  LONGEST FLOWPATH FROM NODE      21.00 TO NODE      25.00 =     559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      25.00 TO NODE      25.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1        1.73    7.15     3.940  0.20( 0.02) 0.10       0.5       21.00
```

```
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     25.00 =    559.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       105.43   12.18     2.914  0.20( 0.05) 0.23      40.6      15.00
    2        82.38   19.14     2.256  0.20( 0.05) 0.24      41.2      11.00
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     25.00 =   2107.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        85.73    7.15     3.940  0.20( 0.05) 0.23      24.3      21.00
    2       106.71   12.18     2.914  0.20( 0.05) 0.23      41.1      15.00
    3        83.37   19.14     2.256  0.20( 0.05) 0.24      41.7      11.00
   TOTAL AREA(ACRES) =          41.7

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       106.71  Tc(MIN.) =    12.182
 EFFECTIVE AREA(ACRES) =      41.06  AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =         41.7
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     25.00 =   2107.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE     25.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.914
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.63      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.63     SUBAREA RUNOFF(CFS) =     1.54
 EFFECTIVE AREA(ACRES) =     41.69   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =        42.3      PEAK FLOW RATE(CFS) =     107.54

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.914
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.91      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.91     SUBAREA RUNOFF(CFS) =     2.22
 EFFECTIVE AREA(ACRES) =     42.60   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =        43.2      PEAK FLOW RATE(CFS) =     109.76

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     41.00  DOWNSTREAM(FEET) =    21.00
 FLOW LENGTH(FEET) =    384.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.95
 ESTIMATED PIPE DIAMETER(INCH) =  33.00      NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      109.76
 PIPE TRAVEL TIME(MIN.) =    0.29    Tc(MIN.) =    12.47
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     37.00 =   2491.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE     37.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE     29.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    385.00
 ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =      53.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.441
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.586
 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.)
 PUBLIC PARK                 D        1.66      0.20      0.850     75    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =       5.10
 TOTAL AREA(ACRES) =       1.66    PEAK FLOW RATE(CFS) =       5.10

****************************************************************************
 FLOW PROCESS FROM NODE      29.00 TO NODE      37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     47.00  DOWNSTREAM(FEET) =      21.00
 FLOW LENGTH(FEET) =    850.00   MANNING'S N =  0.009
 DEPTH OF FLOW IN  12.0 INCH PIPE IS    6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
 ESTIMATED PIPE DIAMETER(INCH) =  12.00     NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =        5.10
 PIPE TRAVEL TIME(MIN.) =    1.25     Tc(MIN.) =      9.69
 LONGEST FLOWPATH FROM NODE       27.00 TO NODE      37.00 =    1235.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =      9.69
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.317
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        4.76      0.20      0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     4.76      SUBAREA RUNOFF(CFS) =     13.48
 EFFECTIVE AREA(ACRES) =        6.42   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =         6.4        PEAK FLOW RATE(CFS) =        18.18

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =      9.69
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.317
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        0.76      0.20      0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     0.76      SUBAREA RUNOFF(CFS) =      2.15
 EFFECTIVE AREA(ACRES) =        7.18   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =         7.2        PEAK FLOW RATE(CFS) =        20.34

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =      9.69
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.317
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        1.05      0.20      0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     1.05      SUBAREA RUNOFF(CFS) =      2.97
 EFFECTIVE AREA(ACRES) =        8.23   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =         8.2        PEAK FLOW RATE(CFS) =        23.31

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  11
----------------------------------------------------------------------------
```

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>>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1       23.31    9.69     3.317  0.20( 0.17) 0.85        8.2       27.00
 LONGEST FLOWPATH FROM NODE       27.00 TO NODE     37.00 =    1235.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1       90.35    7.45     3.850  0.20( 0.05) 0.27       25.8       21.00
    2      109.76   12.47     2.875  0.20( 0.05) 0.26       42.6       15.00
    3       85.64   19.45     2.236  0.20( 0.05) 0.27       43.2       11.00
 LONGEST FLOWPATH FROM NODE       15.00 TO NODE     37.00 =    2491.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1      111.30    7.45     3.850  0.20( 0.08) 0.39       32.2       21.00
    2      122.32    9.69     3.317  0.20( 0.08) 0.38       41.5       27.00
    3      129.80   12.47     2.875  0.20( 0.07) 0.35       50.8       15.00
    4      100.94   19.45     2.236  0.20( 0.07) 0.36       51.4       11.00
   TOTAL AREA(ACRES) =         51.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      129.80  Tc(MIN.) =    12.474
 EFFECTIVE AREA(ACRES) =      50.83  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        51.4
 LONGEST FLOWPATH FROM NODE       15.00 TO NODE     37.00 =    2491.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE     37.00 IS CODE =  12
------------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
==============================================================================

******************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE     37.00 IS CODE =  10
------------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

******************************************************************************
 FLOW PROCESS FROM NODE      31.00 TO NODE     33.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   125.00
 ELEVATION DATA: UPSTREAM(FEET) =      49.70  DOWNSTREAM(FEET) =      47.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     5.000
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                   D        0.74       0.20      0.100     75    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       3.20
 TOTAL AREA(ACRES) =        0.74    PEAK FLOW RATE(CFS) =        3.20

******************************************************************************
 FLOW PROCESS FROM NODE      33.00 TO NODE     35.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      47.20  DOWNSTREAM(FEET) =      27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    295.00   CHANNEL SLOPE =  0.0685
 CHANNEL BASE(FEET) =    12.00    "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =    1.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.983
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 PUBLIC PARK                  D        0.18       0.20      0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        3.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    2.44
 AVERAGE FLOW DEPTH(FEET) =    0.11    TRAVEL TIME(MIN.) =    2.01
 Tc(MIN.) =     7.01
 SUBAREA AREA(ACRES) =        0.18      SUBAREA RUNOFF(CFS) =      0.62
 EFFECTIVE AREA(ACRES) =        0.92     AREA-AVERAGED Fm(INCH/HR) =   0.05
 AREA-AVERAGED Fp(INCH/HR) =   0.20   AREA-AVERAGED Ap =    0.25
 TOTAL AREA(ACRES) =            0.9         PEAK FLOW RATE(CFS) =        3.26
```

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 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.40
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      35.00 =     420.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.01
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.983
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 D        0.69      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     0.69     SUBAREA RUNOFF(CFS) =     2.37
 EFFECTIVE AREA(ACRES) =       1.61   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.51
 TOTAL AREA(ACRES) =          1.6       PEAK FLOW RATE(CFS) =        5.63

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     22.00  DOWNSTREAM(FEET) =     21.00
 FLOW LENGTH(FEET) =     25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS    8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    9.63
 ESTIMATED PIPE DIAMETER(INCH) =  12.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =          5.63
 PIPE TRAVEL TIME(MIN.) =    0.04     Tc(MIN.) =     7.06
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      37.00 =     445.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
     1        5.63    7.06     3.969  0.20( 0.10) 0.51        1.6       31.00
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      37.00 =     445.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
     1      111.30    7.45     3.850  0.20( 0.08) 0.39       32.2       21.00
     2      122.32    9.69     3.317  0.20( 0.08) 0.38       41.5       27.00
     3      129.80   12.47     2.875  0.20( 0.07) 0.35       50.8       15.00
     4      100.94   19.45     2.236  0.20( 0.07) 0.36       51.4       11.00
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      37.00 =    2491.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
     1      114.42    7.06     3.969  0.20( 0.08) 0.39       32.1       31.00
     2      116.75    7.45     3.850  0.20( 0.08) 0.39       33.8       21.00
     3      127.00    9.69     3.317  0.20( 0.08) 0.39       43.2       27.00
     4      133.83   12.47     2.875  0.20( 0.07) 0.36       52.4       15.00
     5      104.05   19.45     2.236  0.20( 0.07) 0.36       53.0       11.00
   TOTAL AREA(ACRES) =          53.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       133.83  Tc(MIN.) =    12.474
 EFFECTIVE AREA(ACRES) =       52.44  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =          53.0
 LONGEST FLOWPATH FROM NODE      15.00 TO NODE      37.00 =    2491.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      37.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      37.00 TO NODE      39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     10.60
 FLOW LENGTH(FEET) =    209.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS   28.0 INCHES
```

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  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.72
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     133.83
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.63
  LONGEST FLOWPATH FROM NODE     15.00 TO NODE     39.00 =    2700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      114.42    7.21    3.920  0.20( 0.08) 0.39     32.1      31.00
      2      116.75    7.60    3.805  0.20( 0.08) 0.39     33.8      21.00
      3      127.00    9.84    3.288  0.20( 0.08) 0.39     43.2      27.00
      4      133.83   12.63    2.855  0.20( 0.07) 0.36     52.4      15.00
      5      104.05   19.62    2.225  0.20( 0.07) 0.36     53.0      11.00
  LONGEST FLOWPATH FROM NODE     15.00 TO NODE     39.00 =    2700.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.67   15.78    2.517  0.20( 0.08) 0.40      9.9       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     39.00 =    2937.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      130.03    7.21    3.920  0.20( 0.08) 0.39     36.6      31.00
      2      132.71    7.60    3.805  0.20( 0.08) 0.39     38.5      21.00
      3      144.79    9.84    3.288  0.20( 0.08) 0.39     49.3      27.00
      4      153.58   12.63    2.855  0.20( 0.07) 0.36     60.4      15.00
      5      142.07   15.78    2.517  0.20( 0.07) 0.37     62.6       1.00
      6      123.12   19.62    2.225  0.20( 0.07) 0.37     62.9      11.00
    TOTAL AREA(ACRES) =          62.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       153.58  Tc(MIN.) =   12.627
  EFFECTIVE AREA(ACRES) =      60.35  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       62.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     39.00 =    2937.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     55.00 IS CODE =  36
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    10.60  DOWNSTREAM(FEET) =     0.82
  FLOW LENGTH(FEET) =    370.00   MANNING'S N =  0.013
  *GIVEN BOX BASEWIDTH(FEET) =   8.00   ESTIMATED BOX HEIGHT(FEET) =    1.48
  BOX-FLOW VELOCITY(FEET/SEC.) =  12.93
  BOX-FLOW(CFS) =     153.58
  BOX-FLOW TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   13.10
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     55.00 =    3307.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  ELEVATION DATA: UPSTREAM(FEET) =     72.00  DOWNSTREAM(FEET) =     55.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.25       0.20      0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =       1.08
```

```
 TOTAL AREA(ACRES) =       0.25   PEAK FLOW RATE(CFS) =      1.08

****************************************************************************
 FLOW PROCESS FROM NODE     43.00 TO NODE     45.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     55.00  DOWNSTREAM(FEET) =     52.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    10.00   CHANNEL SLOPE = 0.3000
 CHANNEL BASE(FEET) =    3.50    "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    0.50
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.813
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        1.70
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.37
 AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.02
 Tc(MIN.) =    5.02
 SUBAREA AREA(ACRES) =     0.30        SUBAREA RUNOFF(CFS) =     1.25
 EFFECTIVE AREA(ACRES) =       0.55     AREA-AVERAGED Fm(INCH/HR) =   0.12
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.59
 TOTAL AREA(ACRES) =          0.6          PEAK FLOW RATE(CFS) =        2.32

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   9.28
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE     45.00 =     270.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.00 TO NODE     47.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     52.00  DOWNSTREAM(FEET) =     32.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE = 0.0800
 CHANNEL BASE(FEET) =    2.00    "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =    3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.409
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.46      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        3.19
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.96
 AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   0.84
 Tc(MIN.) =    5.86
 SUBAREA AREA(ACRES) =     0.46        SUBAREA RUNOFF(CFS) =     1.74
 EFFECTIVE AREA(ACRES) =       1.01     AREA-AVERAGED Fm(INCH/HR) =   0.16
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.78
 TOTAL AREA(ACRES) =          1.0          PEAK FLOW RATE(CFS) =        3.87

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   5.23
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE     47.00 =     520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE = 81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.86
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.409
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.23      0.20      0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.23       SUBAREA RUNOFF(CFS) =     0.91
 EFFECTIVE AREA(ACRES) =       1.24    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =          1.2        PEAK FLOW RATE(CFS) =        4.77

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     49.00 IS CODE = 51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     32.00  DOWNSTREAM(FEET) =     12.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE = 0.0800
 CHANNEL BASE(FEET) =    2.00    "Z" FACTOR =   2.000
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MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =    3.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.128
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
NATURAL FAIR COVER
"OPEN BRUSH"               D         0.42       0.20       1.000     83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        5.52
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.76
AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   0.72
Tc(MIN.) =    6.58
SUBAREA AREA(ACRES) =     0.42        SUBAREA RUNOFF(CFS) =    1.48
EFFECTIVE AREA(ACRES) =       1.66     AREA-AVERAGED Fm(INCH/HR) =   0.15
AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.74
TOTAL AREA(ACRES) =         1.7          PEAK FLOW RATE(CFS) =       5.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.37   FLOW VELOCITY(FEET/SEC.) =   5.88
LONGEST FLOWPATH FROM NODE      41.00 TO NODE     49.00 =     770.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.58
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.128
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 COMMERCIAL                  D         0.22       0.20       0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.22       SUBAREA RUNOFF(CFS) =     0.81
 EFFECTIVE AREA(ACRES) =       1.88    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =         1.9        PEAK FLOW RATE(CFS) =       6.76

****************************************************************************
 FLOW PROCESS FROM NODE      49.00 TO NODE     51.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     12.00  DOWNSTREAM(FEET) =      1.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =    125.00   CHANNEL SLOPE =  0.0808
 CHANNEL BASE(FEET) =     5.00   "Z" FACTOR =    2.000
 MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =  10.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.026
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 PUBLIC PARK                 D         0.54       0.20       0.850     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        7.70
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.01
 AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   0.30
 Tc(MIN.) =    6.88
 SUBAREA AREA(ACRES) =     0.54        SUBAREA RUNOFF(CFS) =    1.87
 EFFECTIVE AREA(ACRES) =       2.42     AREA-AVERAGED Fm(INCH/HR) =   0.14
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.71
 TOTAL AREA(ACRES) =         2.4          PEAK FLOW RATE(CFS) =       8.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.22   FLOW VELOCITY(FEET/SEC.) =   7.19
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE     51.00 =     895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      51.00 TO NODE     51.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.88
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.026
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         2.88       0.20       1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.88       SUBAREA RUNOFF(CFS) =     9.92
 EFFECTIVE AREA(ACRES) =       5.30    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.87
 TOTAL AREA(ACRES) =         5.3        PEAK FLOW RATE(CFS) =      18.38

****************************************************************************
 FLOW PROCESS FROM NODE      51.00 TO NODE     53.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     1.90  DOWNSTREAM(FEET) =     1.35
 FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.02
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.38
 PIPE TRAVEL TIME(MIN.) =   0.04     Tc(MIN.) =     6.93
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      53.00 =     922.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      53.00 TO NODE      53.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.93
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.011
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 COMMERCIAL                   D        0.11        0.20      0.100     75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =      0.11      SUBAREA RUNOFF(CFS) =      0.40
 EFFECTIVE AREA(ACRES) =        5.41   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =           5.4        PEAK FLOW RATE(CFS) =       18.70

****************************************************************************
 FLOW PROCESS FROM NODE      53.00 TO NODE      55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     1.35  DOWNSTREAM(FEET) =     0.82
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.12
 ESTIMATED PIPE DIAMETER(INCH) =  24.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.70
 PIPE TRAVEL TIME(MIN.) =   0.06     Tc(MIN.) =     6.99
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      55.00 =     957.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      55.00 TO NODE      55.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
    1       18.70    6.99     3.990   0.20( 0.17) 0.85        5.4       41.00
 LONGEST FLOWPATH FROM NODE      41.00 TO NODE      55.00 =     957.00 FEET.

 ** MEMORY BANK #   1 CONFLUENCE DATA **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
    1      130.03    7.72     3.772   0.20( 0.08) 0.39       36.6       31.00
    2      132.71    8.11     3.669   0.20( 0.08) 0.39       38.5       21.00
    3      144.79   10.33     3.199   0.20( 0.08) 0.39       49.3       27.00
    4      153.58   13.10     2.796   0.20( 0.07) 0.36       60.4       15.00
    5      142.07   16.27     2.474   0.20( 0.07) 0.37       62.6        1.00
    6      123.12   20.14     2.193   0.20( 0.07) 0.37       62.9       11.00
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      55.00 =    3307.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
    1      143.39    6.99     3.990   0.20( 0.09) 0.46       38.5       41.00
    2      147.66    7.72     3.772   0.20( 0.09) 0.45       42.0       31.00
    3      149.84    8.11     3.669   0.20( 0.09) 0.45       43.9       21.00
    4      159.61   10.33     3.199   0.20( 0.09) 0.43       54.7       27.00
    5      166.43   13.10     2.796   0.20( 0.08) 0.40       65.8       15.00
    6      153.35   16.27     2.474   0.20( 0.08) 0.41       68.0        1.00
    7      133.02   20.14     2.193   0.20( 0.08) 0.41       68.3       11.00
   TOTAL AREA(ACRES) =           68.3

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       166.43  Tc(MIN.) =     13.104
 EFFECTIVE AREA(ACRES) =       65.76  AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =         68.3
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      55.00 =    3307.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      55.00 TO NODE      55.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
>>>>>CLEAR MEMORY BANK # 1 <<<<<
==========================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     67.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      0.82  DOWNSTREAM(FEET) =      0.76
 FLOW LENGTH(FEET) =     34.00   MANNING'S N = 0.013
 *GIVEN BOX BASEWIDTH(FEET) =  11.00   ESTIMATED BOX HEIGHT(FEET) =     2.99
 BOX-FLOW VELOCITY(FEET/SEC.) =    5.07
 BOX-FLOW(CFS) =     166.43
 BOX-FLOW TRAVEL TIME(MIN.) =   0.11     Tc(MIN.) =   13.22
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE     67.00 =     3341.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     67.00 TO NODE     67.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     59.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    330.00
 ELEVATION DATA: UPSTREAM(FEET) =     69.70  DOWNSTREAM(FEET) =      67.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.939
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.205
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL  AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         1.47      0.20      1.000     83   19.94
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       2.65
 TOTAL AREA(ACRES) =       1.47   PEAK FLOW RATE(CFS) =       2.65

****************************************************************************
 FLOW PROCESS FROM NODE     59.00 TO NODE     61.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     67.70  DOWNSTREAM(FEET) =      37.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    660.00   CHANNEL SLOPE =  0.0465
 CHANNEL FLOW THRU SUBAREA(CFS) =        2.65
 FLOW VELOCITY(FEET/SEC) =     3.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =    2.79    Tc(MIN.) =   22.73
 LONGEST FLOWPATH FROM NODE      57.00 TO NODE     61.00 =      990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   22.73
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.047
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D         3.46      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =      3.46     SUBAREA RUNOFF(CFS) =      5.75
 EFFECTIVE AREA(ACRES) =       4.93   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         4.9       PEAK FLOW RATE(CFS) =        8.20

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     63.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     37.00  DOWNSTREAM(FEET) =     35.00
 FLOW LENGTH(FEET) =     80.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    8.86
 ESTIMATED PIPE DIAMETER(INCH) =  15.00     NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =       8.20
 PIPE TRAVEL TIME(MIN.) =    0.15     Tc(MIN.) =    22.88
 LONGEST FLOWPATH FROM NODE      57.00 TO NODE     63.00 =     1070.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      63.00 TO NODE      65.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      35.00  DOWNSTREAM(FEET) =      10.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    406.00   CHANNEL SLOPE =  0.0616
  CHANNEL FLOW THRU SUBAREA(CFS) =          8.20
  FLOW VELOCITY(FEET/SEC) =    5.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =    1.15    Tc(MIN.) =    24.03
  LONGEST FLOWPATH FROM NODE      57.00 TO NODE      65.00 =     1476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      65.00 TO NODE      65.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    24.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.984
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               D          4.04       0.20       1.000     83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.04      SUBAREA RUNOFF(CFS) =      6.49
  EFFECTIVE AREA(ACRES) =       8.97   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =          9.0       PEAK FLOW RATE(CFS) =       14.40

****************************************************************************
  FLOW PROCESS FROM NODE      65.00 TO NODE      67.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =       1.90  DOWNSTREAM(FEET) =       0.76
  FLOW LENGTH(FEET) =     70.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =    8.75
  ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        14.40
  PIPE TRAVEL TIME(MIN.) =    0.13     Tc(MIN.) =    24.16
  LONGEST FLOWPATH FROM NODE      57.00 TO NODE      67.00 =     1546.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity    Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
      1       14.40    24.16     1.978   0.20( 0.20) 1.00        9.0        57.00
  LONGEST FLOWPATH FROM NODE      57.00 TO NODE      67.00 =     1546.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity    Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
      1      143.39     7.11     3.953   0.20( 0.09) 0.46       38.5        41.00
      2      147.66     7.84     3.740   0.20( 0.09) 0.45       42.0        31.00
      3      149.84     8.22     3.640   0.20( 0.09) 0.45       43.9        21.00
      4      159.61    10.44     3.179   0.20( 0.09) 0.43       54.7        27.00
      5      166.43    13.22     2.783   0.20( 0.08) 0.40       65.8        15.00
      6      153.35    16.38     2.464   0.20( 0.08) 0.41       68.0         1.00
      7      133.02    20.26     2.185   0.20( 0.08) 0.41       68.3        11.00
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE      67.00 =     3341.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc    Intensity    Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
      1      152.33     7.11     3.953   0.20( 0.10) 0.49       41.2        41.00
      2      156.96     7.84     3.740   0.20( 0.10) 0.49       44.9        31.00
      3      159.33     8.22     3.640   0.20( 0.10) 0.49       47.0        21.00
      4      170.05    10.44     3.179   0.20( 0.09) 0.47       58.6        27.00
      5      177.88    13.22     2.783   0.20( 0.09) 0.44       70.7        15.00
      6      165.79    16.38     2.464   0.20( 0.09) 0.45       74.1         1.00
      7      146.50    20.26     2.185   0.20( 0.09) 0.47       75.9        11.00
      8      134.30    24.16     1.978   0.20( 0.10) 0.48       77.3        57.00
    TOTAL AREA(ACRES) =          77.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      177.88  Tc(MIN.) =    13.216
  EFFECTIVE AREA(ACRES) =      70.67  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =         77.3
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE      67.00 =     3341.00 FEET.
```

EXHIBIT A

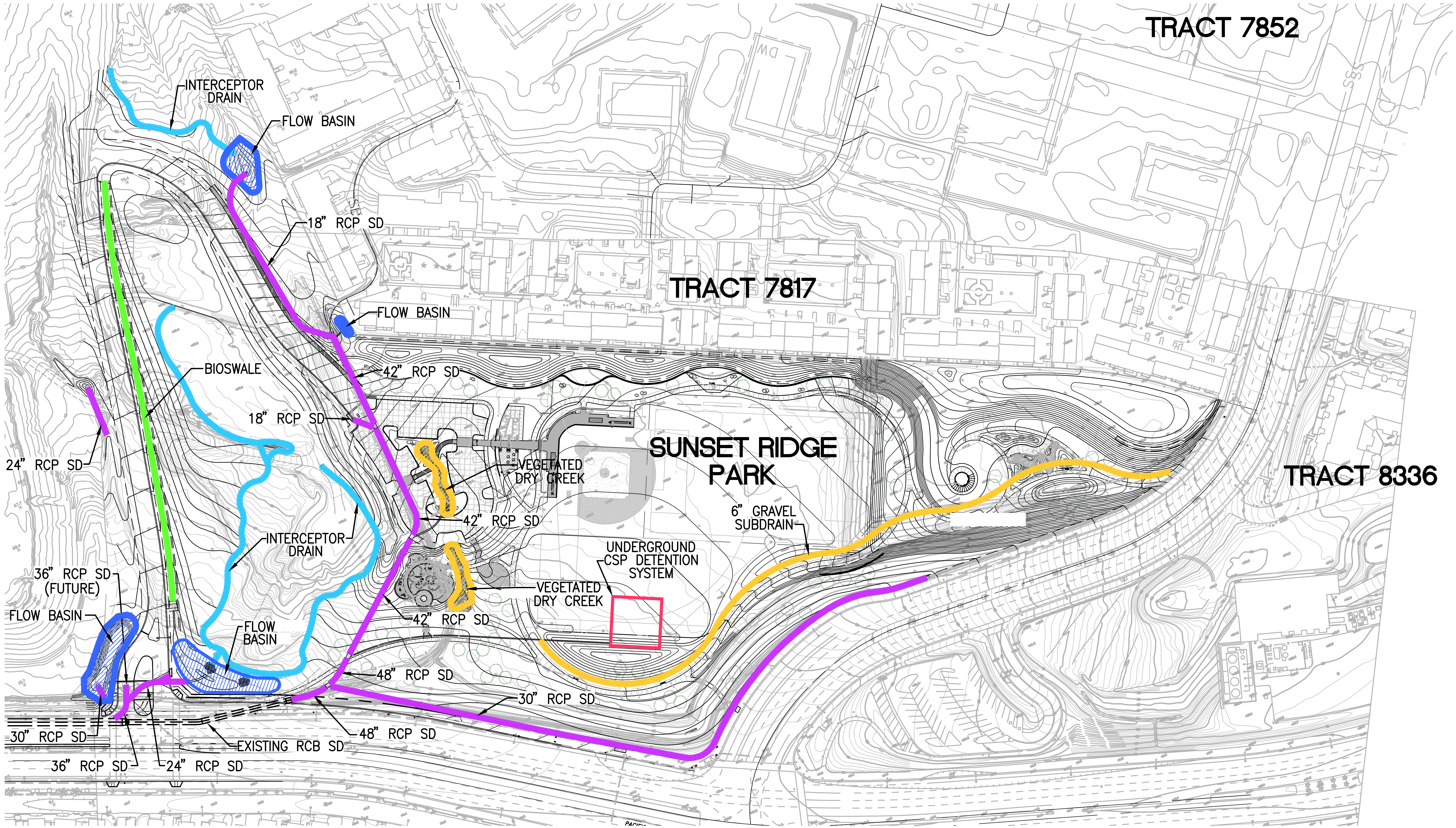

EXHIBIT A

SCALE: 1" = 150'

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS

23 MAUCHLY, SUITE 110
IRVINE, CA 92618
949-727-9095 PHONE
949-727-9098 FAX

HYDROLOGY MAP(S)

LEGEND

(solid line)	WATERSHED BOUNDARY
(dashed line)	SUB-AREA BOUNDARY
(flowline arrow)	FLOWLINE AND DIRECTION OF FLOW
X	SUB-AREA LABEL
Y	AREA (ACRES)
(100)	NODE NUMBER
Q10	10 YEAR PEAK FLOW (CFS)
Q25	25 YEAR PEAK FLOW (CFS)
Qconf	25 YEAR CONFLUENCE PEAK FLOW (CFS)
Tc	TIME OF CONCENTRATION (25 YEAR STORM, IN MIN.)
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
INV	INVERT OF PIPE
L=X'	LENGTH OF FLOWPATH (FT)

SOIL TYPE "D" USED FOR ANALYSIS

REVISIONS:

MARK	DESCRIPTION	BY	APPR.	DATE

DESIGNED BY: TPA
DRAWN BY: TPA
CHECKED BY: TPA
PROJECT MANAGER: TPA

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS
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IRVINE, CA 92618
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949-727-9098 FAX

HYDROLOGY MAP
SUNSET RIDGE PARK
EXISTING CONDITION

P:\114.192\Hydrology\192-HYD-EX.dwg
Jul 03, 2009 – 2:00PM

SOIL TYPE "D" USED FOR ANALYSIS

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

LEGEND

	WATERSHED BOUNDARY
	SUB-AREA BOUNDARY
	FLOWLINE AND DIRECTION OF FLOW
X	SUB-AREA LABEL
Y	AREA (ACRES)
100	NODE NUMBER
Q10	10 YEAR PEAK FLOW (CFS)
Q25	25 YEAR PEAK FLOW (CFS)
Qconf	25 YEAR CONFLUENCE PEAK FLOW (CFS)
Tc	TIME OF CONCENTRATION (25 YEAR STORM, IN MIN.)
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
INV	INVERT OF PIPE
L=X'	LENGTH OF FLOWPATH (FT)

SHEET 2 OF 2

REVISIONS:				
MARK	DESCRIPTION	BY	APPR.	DATE

DESIGNED BY: TPA
DRAWN BY: TPA
CHECKED BY: TPA
PROJECT MANAGER: TPA

URBAN RESOURCE
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HYDROLOGY MAP
SUNSET RIDGE PARK
EXISTING CONDITION

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Jul 03, 2009 – 2:02PM

SOIL TYPE "D" USED FOR ANALYSIS

LEGEND

(solid line)	WATERSHED BOUNDARY
(dashed line)	SUB-AREA BOUNDARY
(dash-dot arrow)	FLOWLINE AND DIRECTION OF FLOW
X	SUB-AREA LABEL
Y	AREA (ACRES)
(100)	NODE NUMBER
Q10	10 YEAR PEAK FLOW (CFS)
Q25	25 YEAR PEAK FLOW (CFS)
Qconf	25 YEAR CONFLUENCE PEAK FLOW (CFS)
Tc	TIME OF CONCENTRATION (25 YEAR STORM, IN MIN.)
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
INV	INVERT OF PIPE
L=X'	LENGTH OF FLOWPATH (FT)

REVISIONS:

MARK	DESCRIPTION	BY	APPR.	DATE

DESIGNED BY: TPA — DRAWN BY: TPA
CHECKED BY: TPA — PROJECT MANAGER: TPA

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS
23 MAUCHLY, SUITE 110
IRVINE, CA 92618
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HYDROLOGY MAP
SUNSET RIDGE PARK
PROPOSED CONDITION

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Jul 03, 2009 - 2:07PM

SOIL TYPE "D" USED FOR ANALYSIS

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

LEGEND

(solid heavy line)	WATERSHED BOUNDARY
(heavy dashed line)	SUB-AREA BOUNDARY
(dash-dot arrow)	FLOWLINE AND DIRECTION OF FLOW
X	SUB-AREA LABEL
Y	AREA (ACRES)
(100)	NODE NUMBER
Q10	10 YEAR PEAK FLOW (CFS)
Q25	25 YEAR PEAK FLOW (CFS)
Qconf	25 YEAR CONFLUENCE PEAK FLOW (CFS)
Tc	TIME OF CONCENTRATION (25 YEAR STORM, IN MIN.)
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
INV	INVERT OF PIPE
L=X'	LENGTH OF FLOWPATH (FT)

SHEET 2 OF 2

REVISIONS:				
MARK	DESCRIPTION	BY	APPR.	DATE

DESIGNED BY: TPA	DRAWN BY: TPA
CHECKED BY: TPA	PROJECT MANAGER: TPA

URBAN RESOURCE
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23 MAUCHLY, SUITE 110
IRVINE, CA 92618
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HYDROLOGY MAP
SUNSET RIDGE PARK
PROPOSED CONDITION

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Jul 03, 2009 – 2:11PM

PRELIMINARY WATER QUALITY MANAGEMENT PLAN FOR SUNSET RIDGE PARK 4850 WEST COAST HIGHWAY NEWPORT BEACH, CA 92663

PREPARED FOR:

CITY OF NEWPORT BEACH
3300 NEWPORT BLVD.
NEWPORT BEACH, CA 92663
(949) 644-3342

PREPARED BY:

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS

AUGUST 3, 2009

OWNER'S CERTIFICATION
WATER QUALITY MANAGEMENT PLAN

This Water Quality Management Plan has been prepared for Sunset Ridge Park by Urban Resource Corporation. It is intended to comply with the requirements of the City of Newport Beach council policies No. L-18 and No. L-22, the California Regional Water Quality Control Board NPDES No. CAS618030, Order No. R8-2009-0030, and the latest Model WQMP per the Orange County Drainage Area Management Plan, requiring the preparation of a Water Quality Management Plan (WQMP). The undersigned is aware and understands that this report is prepared to meet the latest permits and Model WQMP, and shall be updated to meet requirements of new permits and/or Model WQMP, if required under requirements of the new permits and/or Model WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP). Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved-signed copies of this document shall be available on the subject site in perpetuity.

Mr. Michael Sinacori
Assistant City Engineer
City of Newport Beach, CA
(949) 644-3342

Date: August 3, 2009

TABLE OF CONTENTS

ATTACHMENTS

1. Vicinity Map

2. Water Quality Treatment Plan

3. Best Management Practices for New Development Including Non-residential Construction Sites (Tables 1 and 2 only)

4. Educational Materials

   A. "After the Storm" - U.S.E.P.A. Publication

   B. “The Ocean Begins at Your Front Door” Brochure

   C. "Protecting Water Quality from Urban Runoff” - U.S.E.P.A. Publication

   D. "Proper Disposal of Household Hazardous Waste" Brochure

   E. "Keeping Pest Control Products Out of Creeks, Rivers, and The Ocean" Brochure

   F. "When it Rains, It Drains” Brochure

   G. "The Solution to Stormwater Pollution" - U.S.E.P.A. Publication

   H. “Tips for Pet Care” Brochure

WATER QUALITY MANAGEMENT PLAN
"SUNSET RIDGE PARK"
NEWPORT BEACH, CALIFORNIA

I. DISCRETIONARY PERMIT

There are no discretionary permits, conditional use permits, or any other final approvals required for this project. This Water Quality Management Plan is intended to comply with the requirements of the City of Newport Beach council policies No. L-18 and No. L-22, the California Regional Water Quality Control Board NPDES No. CAS618030, Order No. R8-2009-0030, and the latest Model WQMP per the Orange County Drainage Area Management Plan.

This WQMP shall identify, at a minimum, the routine, structural and non-structural measures specified in the Countywide Drainage Area Management Plan (DAMP) Appendix which details implementation of BMPs whenever they are applicable to a project, the assignment of long-term maintenance responsibilities (specifying the developer, parcel owner, maintenance association lessee, etc.); and, shall reference the location(s) of structural BMPs."

II. PROJECT DESCRIPTION

The City of Newport Beach is proposing a Public Park to be developed at the northwest intersection of West Coast Highway and Superior Avenue. The total limits of work, which includes the park itself plus all grading for the entry road through Newport Banning Ranch required to daylight to the existing grades, for the project are approximately 20.4 acres.

The park will include an entry road from West Coast Highway leading to the parking lot, two soccer fields, a baseball field, a playground and picnic area, memorial garden/passive park area, walking paths, and overlook area with shade structure.

Drainage improvements will be required for the construction of the park and includes removal of existing concrete v-ditches and terraces drains, and installation of RCP storm drain lines, PVC storm drain lines, a detention basin, a bio-swale, a vegetated dry creek, a proposed underground detention system, interceptor drains, and a gravel subdrain. The proposed v-ditches will be provided at toe of slopes to collect runoff and route it to the downstream collection point. The terrace drains will be provided at daylight to existing grades to prevent existing runoff from draining through newly graded slopes, causing erosion. The detention basin is proposed at the entry road at West Coast Highway to provide water quality treatment, and a reduction to the increase in peak flows caused by the development. The bio-swales and vegetated dry creek is proposed to provide water quality treatment to meet water quality treatment requirements. The underground detention system is proposed to reduce proposed flows to that of the existing condition. The gravel subdrain is proposed across the south end of the park to pick up existing groundwater seepage that was previously exiting the site through the slopes along West Coast Highway. Refer to the Sunset Ridge Park Preliminary Hydrology Report for additional details. All site runoff is collected and routed with the use of RCP and PVC piping, and will ultimately drain into the existing RCB storm drain in West Coast Highway. The onsite storm drain system will also collect existing runoff from the apartment site to the north, Tract 7852 and Tract 7817, as well as flows from Superior Avenue, and the open space runoff entering through the site, to maintain existing condition drainage patterns.

Additional work for this project will include, but is not limited to demolition, grading, landscaping, concrete finishing and curing, street improvements, and utility improvements.

III. SITE DESCRIPTION

The existing site is barren open brush space located at 4850 West Coast Highway, in the City of Newport Beach, at the northwest intersection of West Coast Highway and Superior Avenue. A project location map is provided in Attachment 1. The project site has been previously graded and a portion of the existing site, owned by the City, is subject to regular maintenance activities for fuel modification and weed abatement.

The proposed site will slightly increase imperviousness due to the addition of the entry road, parking lot, play area hardscape, and walking paths. All impervious areas are considered in determining the required treatment runoff to be treated, for this development. The approximate impervious area for the proposed site is 2.94 acres, or 14.4%. This percentage, along with the total area of the project, including all areas requiring grading, is used to calculate the water quality treatment flows required for this project. An intensity of 0.2 in./hr is used per the Orange County DAMP. The coefficient of runoff, C factor of 0.26, is used, and is based on the site imperviousness and factors provided in Table A-1 per the Orange County DAMP. All calculations are provided herewith in Attachment 5.

The existing drainage patterns of the existing site route runoff south and west via existing concrete v-ditches and terrace drains. All runoff is routed to the existing concrete box culvert located in West Coast Highway. The proposed condition flows will maintain the same drainage patterns from the existing condition.

Potential pollutants that may be associated with Sunset Ridge Park include, but is not limited to, Bacteria/Virus, Heavy Metals, Nutrients, Pesticides, Organic Compounds, Sediments, Trash and Debris, Oxygen Demanding Substances, and Oil and Grease. The Park is located within Watershed D per the County of Orange ESA Watershed Maps. Additiionally, the park is not directly adjacent to, or discharging directly into receiving water within and Environmentally Sensitive Area. The nearest 303d Listed Water Body is the Pacific Ocean – Huntington Beach State Park.

IV. BEST MANAGEMENT PRACTICES FOR THE POST CONSTRUCTION PHASE

Pursuant to the Pollutant Runoff Condition, this WQMP identifies and establishes BMPs that will be used on-site to control predictable pollutant runoff. These BMPs are discussed below. (Note: BMP tables from the Orange County Drainage Area Management Plan entitled "Best Management Practices for New Development Including Non-Residential Construction Sites" are included with this report as Attachment 3.) All "routine" structural and non-structural measure specified in the Countywide Drainage Area Management Plan (DAMP) are covered, as well as the assignment of long-term maintenance responsibilities (see VI. and VII. Structural and Non-Structural BMP Maintenance Responsibility/Frequency Matrix, pages 12-13) and the locations of all structural BMPs (see the three Site Plans in Attachment 2). The reasons why some routine BMPs are not applicable are discussed below. There are no known "special" BMPs yet required for this site for compliance with environmental impact or other watershed planning documentation.

The structural BMPs to be implemented during the post construction phase by The City of Newport Beach are as follows:

Provide Storm Drain Stenciling and Signage

Phrase "No Dumping - Drains to Ocean" phrase to be stenciled on catch basins to alert the public to the destination of pollutants discharged into storm water.

Design Outdoor Hazardous Material Storage Areas to Reduce Pollutant Introduction

There are no outdoor areas for storage of hazardous materials that may contribute pollutants to the municipal storm drain system.

Design Trash Storage Areas to Reduce Pollutant Introduction

All trash container areas shall provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation. Connection of trash area drains to the municipal storm drain is not allowed. Trash container areas shall be paved with an impervious surface.

Use Efficient Irrigation Systems and Landscape Design

Fertilizer/pesticide/herbicide and irrigation management practices and landscape management practices will be maintained consistent with the County Ordinance Amending the Zoning Code Regarding the Conservation of Water in Landscaping for Common Areas of Multifamily and Non-Residential Development. Fertilizer and pesticide usage will be administered consistent with the Orange County's "Management Guidelines for the Use of Fertilizers and Pesticides" (M.G.F.P.). The design and maintenance of the irrigation system would utilize state of the art technology that minimizes both the amount of water applied and the amount of runoff. The system will also be designed with the criteria established by the County of Orange and the City of Newport Beach. The combination of technology and design criteria leads to an efficient and ecological system for landscape irrigation. Selections will be made based on similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Irrigation design or maintenance deficiencies that cause excessive runoff of irrigation water will be immediately corrected. See matrix on pages 8 for maintenance details.

Protect Slopes and Channels

Slopes shall be vegetated to slow runoff drainage. Energy dissipaters, such as rip rap, shall be installed to reduce velocities, if needed, and minimize impacts to receiving waters. Terrace drains shall be installed to collect existing runoff from draining into newly graded slopes, to protect proposed grading from erosion.

The non-structural BMPs to be implemented during the post construction phase are as follows:

N1. Education for Property Owners and Tenants of the Commercial Site – The City of Newport Beach shall periodically provide environmental awareness education materials to its tenants. These materials are included in this report in Attachment 5. See matrix on page 12 for details.

N2. Activity Restrictions – Rules or guidelines for Sunset Ridge Park are established within appropriate documents, if applicable, which prohibit activities that can result in discharges of pollutants. Activity restrictions are the responsibility of the City of Newport Beach.

N3. Landscape Management for the Site – City-approved Landscape Construction Plans will be prepared. All landscape maintenance activities will conform to the Orange County Management Guidelines for the Use of Fertilizers and Pesticides (M.G.F.P.). See matrix on page 12 for maintenance details. The key applicable landscape BMPs are explained further below.

- Minimize irrigation runoff by using controllers to provide several short cycles instead of one long cycle for each area.
- Immediately correct any irrigation design or maintenance deficiencies that cause excessive runoff of irrigation water.
- Have application, storage, handling, and transportation of fertilizer follow the recommendations of the Orange County M.G.F.P., Sections 2.0.4 and 2.0.5.
- Prohibit application of chemicals less than three days prior to predicted chance of rain.

- Follow all fertilizer application with light irrigation to permit the fertilizer to soak into the landscape area.
- Conduct annual testing of turf soil until results stabilize and an accurate determination can be made of fertilization needs in addition to a corresponding reduction in the application of unnecessary fertilizers. Soil testing and pursuant recommendations for fertilizer use will be conducted by a qualified fertilizer specialist as recommended in the Orange County M.G.F.P., Section 2.3.1.
- Limit weed control to either mechanical methods or EPA-labeled herbicides.
- Pesticides are to be used only after recommendation from a state-licensed pest control advisor per the Orange County M.G.F.P., Section 3.3.1.
- Pesticides are only to be applied by, or under the direct supervision of, a state-licensed or certified pesticide applicator or by workers with equivalent training per the Orange County M.G.F.P., Section 3.4.1.
- The storage, handling, and transportation of pesticides will follow the recommendations of the Orange County M.G.F.P., Section 3.0.

N4. BMP Maintenance – The City of Newport Beach will be responsible for implementing each of the stated non-structural BMP's. The contact person for The City of Newport Beach is Mr. Michael Sinacori, Assistant City Engineer, at (949) 644-3342. See the matrix on page 12 for maintenance details.

N5. Title 22 CCR Compliance – There will be no hazardous wastes present on this site. This compliance is not applicable.

N6. Local Water Quality Permit Compliance – The Water Quality Management Plan shall comply with the City of Newport Beach Council Policies No. L-18 and No. L-22.

N7. Spill Contingency Plan – A spill contingency plan is not applicable for Sunset Ridge Park. There are no proposed buildings which mandate stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, or documentation.

N8. Underground Storage Tank Compliance – There will be no underground storage tanks on this site. This compliance is not applicable.

N9. Hazardous Materials Disclosure Compliance – There will be no hazardous materials on this site. This compliance is not applicable.

N10. Uniform Fire Code Implementation – There will be no hazardous materials on this site, and thus compliance with Article 80 of the Uniform Fire Code is not applicable.

N11. Common Area Litter Control – The City of Newport Beach will implement trash management and litter control procedures on the site aimed at reducing pollution of drainage water. The City of Newport Beach may contract with its landscape maintenance firms to provide this service during regularly scheduled maintenance. It will consist of litter patrol and emptying of trash receptacles. See matrix on page 12 for maintenance details.

N12. Employee Training – Employee training shall be provided to Park maintenance personnel, and is the responsibility of the City of Newport Beach.

N13. Housekeeping of Loading Docks – There will be no loading docks on this site. Housekeeping of loading docks is not applicable.

N14. Private Catch Basin Inspection – The City of Newport Beach shall inspect, and if necessary clean, private catch basins within the project site prior to the storm season and no later than October 1^{ST} of each year. Effective post-construction maintenance of storm collection and conveyance facilities will ensure not only their intended use, but will also prevent excessive pollutants from entering the drainage system. Occasionally, catch basins and other drainage facilities become clogged by sediment and debris accumulation. In addition, it is not uncommon for illicit dumping of waste material—particularly used motor oil—to occur at catch basins and drainage facilities. Periodic cleaning of catch basins and storm drains will provide the following benefits. See matrix on page 12 for maintenance schedule and details.

- Removal of pollutant loads from storm drain system
- Reduction of high pollutant concentration during the "first flush" event
- Prevention of clogging of the downstream storm water conveyance system

N15. Street Sweeping of Private Streets and Parking Lots – The City of Newport Beach shall require that the private streets and parking areas within the site be swept prior to the storm season, no later than October 1^{ST} of each year. See matrix on page 12 for maintenance schedule and details.

N17. Retail Gasoline Outlets – There are no retail gasoline outlets on this site. This BMP is not applicable.

Site Design BMPs

The most effective means of avoiding or reducing water quality and hydrologic impacts is through incorporation of measures into the project design. These measures should be taken into consideration early in the planning of a project as they can affect the overall design of a project.

The design of the proposed project has considered and incorporated site design concepts as described below.

SITE DESIGN CONCEPT 1: MINIMIZE STORMWATER RUNOFF, MINIMIZE PROJECT'S IMPERVIOUS FOOTPRINT AND CONSERVE NATURAL AREAS

1. **Minimizing impervious footprint:** The amount of impervious footprint shall be kept at a minimum, where possible. Ramps and walks will be designed to provide a route compliant with ADA accessibility requirements with consideration for minimizing the impervious footprint and maximizing pervious landscape areas.

2. **Conservation of natural areas:** A natural habitat area located between the park and proposed Banning Ranch entry road shall be preserved.

3. **Use of permeable paving or other surfaces:** Permeable pavers or other permeable material may be used for the park parking lot.

4. **Designing to minimum widths necessary**: The walkways and parking lot aisles shall be designed to the minimum widths necessary.

5. **Reduced street widths:** The project does not include any private streets. Incorporation of reduced street widths is not applicable.

6. **Maximize canopy interception and water conservation:** Canopy interception and water conservation will be addressed by preserving existing trees and shrubs deemed necessary by the City of Newport Beach.

7. **Minimizing impervious surfaces in landscaping:** The landscape design will minimize the use of impervious surfaces in the landscape design. Pervious materials such as pervious pavers, turf, permeable concrete, etc. should be considered in the design, if applicable and feasible.

8. **Use of natural drainage systems:** Natural drainage systems such as bio-swales and vegetated dry creeks shall be incorporated into the design, if appropriate.

9. **Low flow infiltration:** The project will not include any low flow infiltration since there is already groundwater seepage present on the site.

10.	**Onsite ponding areas or retention facilities:** Onsite ponding or retention facilities is not a proposed option for this project.

SITE DESIGN CONCEPT 2: MINIMIZE DIRECTLY CONNECTED IMPERVIOUS AREAS (DCIAs)

1.	**Draining rooftops into adjacent landscaping:** The project does not include any rooftops. Incorporation of draining rooftops to adjacent landscaping is not applicable.
2.	**Draining to adjacent landscaping:** All walkways will drain into adjacent landscaping. The proposed parking will drain into the proposed vegetated dry creek for cleansing.
3.	**Vegetated bio-swales:** Vegetated drainage bio-swales shall be considered as a treatment control BMP, if determined appropriate, for this project.
4.	**Site drainage system:** Direct runoff from park walkways and landscaping shall be directed to a swale or the proposed area drain system. All runoff will be directed or routed via drainlines, to the appropriate treatment control system, prior to entering the existing RCB storm drain system in West Coast Highway. The entry road flows shall drain into an adjacent bio-swale for cleansing. Entry road peak flows shall be collected by a catch basin. Parking lots flows will travel through a proposed vegetated dry creek for cleansing, and is picked up by an area drain system.
5.	**Design of Driveways:** The entry road will be designed to route “first flush” flows into a proposed bio-swale for cleansing.
6.	**Design of parking areas:** The proposed park parking lot may use permeable pavers. Drainage design for the parking lot will drain flows into the vegetated dry creek for cleansing.

Treatment BMPs

Treatment Control for the site will be provided with the use of proprietary control measures, bio-swales, and/or other mitigation measure to treat the required “first flush”. A couple of options are tentatively proposed for water quality treatment, and are listed below. Please note that the available options for water quality treatment are vast, and other options not listed herewith may be considered at a later time. Additionally, this project currently falls under the latest permits and Orange County Model WQMP, and should this project fall under any new permits or Model WQMP, a revision is required to meet the changes, if any. The calculations for water quality treatment flows required for Sunset Ridge Park, per the OC DAMP, is provided herewith in Attachment 5.

Name	Included?		If not applicable, state brief reason
	Yes	No	
Vegetated (Grass) Strips		x	Vegetated strips not proposed due to aesthetics and the available options that will be considered for treatement control.
Bio-Swales (Grass)	x		
Proprietary Control Measures	x		
Dry Detention Basin	x		
Wet Detention Basin	x		
Constructed Wetland		x	Not proposed at this stage, but may be considered during the detailed design stage, if deemed appropriate based on site constraints and feasibility.
Detention Basin/Sand Filter	x		
Porous Pavement Detention		x	Not considered due to site contraints and the other available options.
Porous Landscape Detention		x	Not considered since there are other available options.
Infiltration Basin		x	Not considered for this project due to the existing groundwater seepage present at the site.
Infiltration Trench		x	Not considered for this project due to the existing groundwater seepage present at the site.
Media Filter		x	Not considered since proprietary control measure using media filtration is being considered.

Option 1:

- Bio-Swale – To treat Soccer fields, baseball field, Memorial Garden, and adjacent proposed landscaping; to treat entry road and adjacent runoff from proposed landscaping.
- Vegetated Dry Creek – To treat parking lot.
- Contech StormFilter Vault – To treat the remaining required “first flush” flows not treated by other systems. Vault to treat the “equivalent” required “first flush” from Superior Avenue and portion of Tract 7852.

Option 2:

- Vegetated Dry Creek – To treat parking lot.
- Contech StormFilter Vault – To treat the remaining required "first flush" flows not treated by other systems. Vault to treat the "equivalent" required "first flush" from Tract 7852 and Tract 7817.

Other Available Measures:

- Rain Gardens
- Cisterns
- Pervious Pavers
- Infiltration Systems
- Vegetated Grass Strips

V. INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPs

Inspection and maintenance of BMPs will be implemented by The City of Newport Beach prior to completion of the project. The specifics of these responsibilities are discussed in the following "Structural/Non-Structural BMP Maintenance Responsibility/Frequency Matrix", and "Treatment Control BMP Maintenance Responsibility/Frequency Matrix" sections. The contact person for The City of Newport Beach is Mr. Michael Sinacori, Assistant City Engineer, at (949) 644-3342.

The City of Newport Beach will retain all maintenance records for a period of at least five years from the date generated. Those records will be available for review by government agencies. The methods used for inspection and maintenance will conform to the guidelines outlined in the Orange County "Drainage Area Management Plan".

	BMP	RESPONSIBILITY	FREQUENCY
	Provide Storm Drain System Stenciling and Signage	Implemented and maintained by The City of Newport Beach.	Initially done by contractor during construction of the catch basins and then repainted every 5 years. Inspect annually and repaint as necessary.
	Use Efficient Irrigation Systems and Landscape Design	Implemented and maintained by The City of Newport Beach.	Monitor landscape irrigation areas weekly in conjunction with maintenance activities
	Protect Slopes and Channels	Implemented and maintained by The City of Newport Beach.	Monitor and/or clean once a week, in conjunction with maintenance activities

	BMP	RESPONSIBILITY	FREQUENCY
N1, N2	Education and Activity Restrictions	The City of Newport Beach will provide educational materials regarding downstream water quality, as required.	Continuous.
N3	Landscape Management of Common Areas	Implemented by The City of Newport Beach who will provide ongoing maintenance of common areas consistent with County approved water quality guidelines.	Monthly review of landscape maintenance and irrigation procedures to ensure effectiveness.
N11	Common Area Litter Control	Implemented and maintained by The City of Newport Beach.	Weekly sweeping and trash pick up within landscape areas and outside walkways. Daily inspection of trash receptacles to ensure that lids are closed and any excess trash on the ground is picked up.
N14	Catch Basin Inspection	Implemented and maintained by The City of Newport Beach.	Yearly to clean debris and silt in bottom of catch basins. Intensified around October 1ST of each year prior to “first flush” storm.
N15	Street Sweeping	Implemented and maintained by The City of Newport Beach.	Weekly vacuum sweeping. Intensified around October 1ST of each year prior to “first flush” storm.

	BMP	RESPONSIBILITY	FREQUENCY
	Proprietary Control Measure(s)	Implemented and maintained by The City of Newport Beach and/or Manufacturer.	Minimum 2 scheduled visits per year, scheduled seasonally in the spring and fall.
	Bioswale; Vegetated Dry Creek	Implemented and maintained by The City of Newport Beach.	Monitor and/or clean once a week, in conjunction with maintenance activities, as required.

ATTACHMENT 1

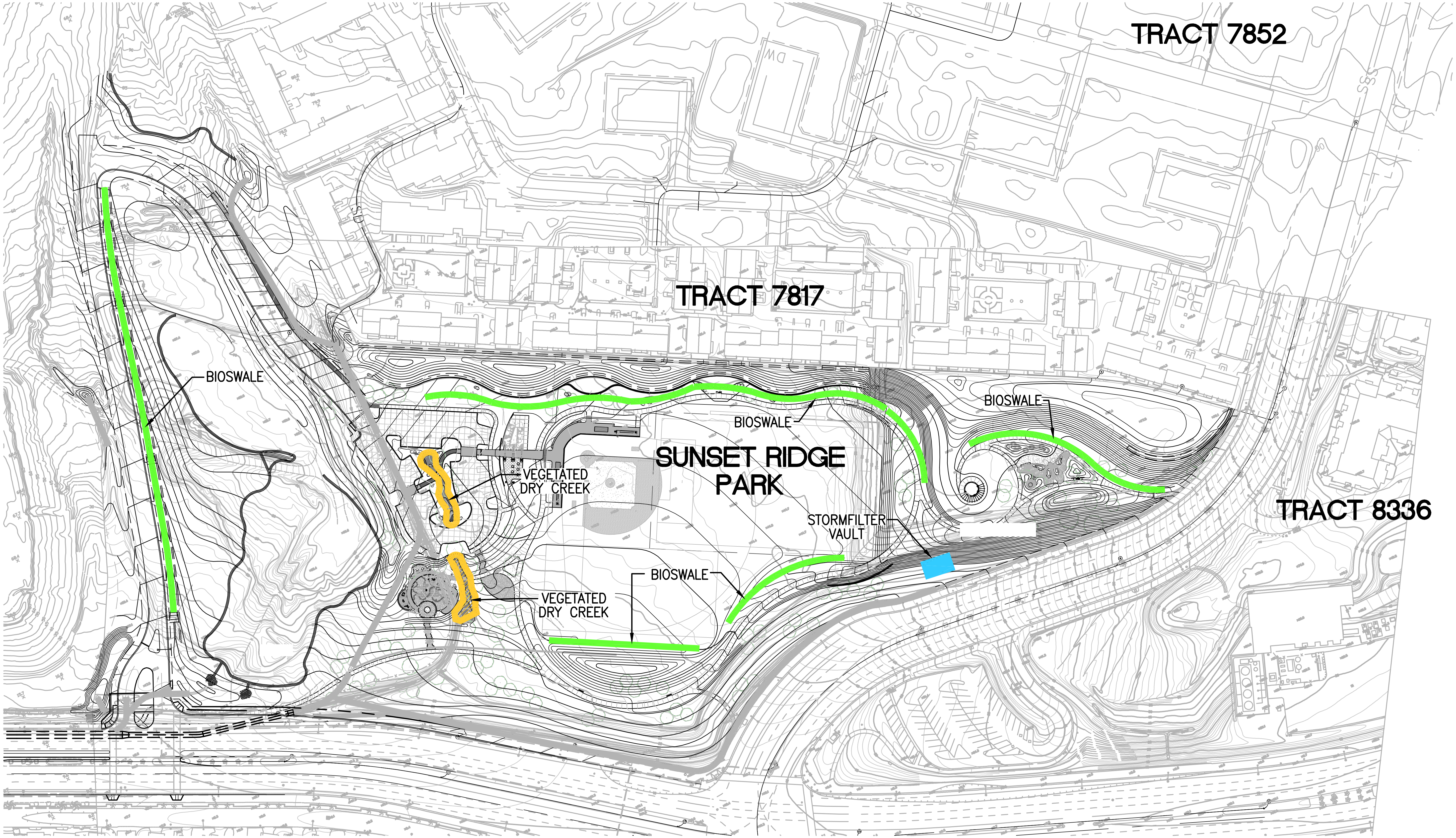
VICINITY MAP

Industrial Park Way
W 15th St
Sea Cliff
Monrovia Ave
Halyard
Ticonderoga St
Aries Ct
Robon Ct
Mojo Ct
Seascape Dr
Gretel Ct
Hospital Rd
McNeil Ln
Nice Ln
Cagney Ln
Lille Ln
Paris Ln
Project Location
Jo Anne Pl
54th St
52nd St
51st St
River Ave
Neptune Ave
Seashore Dr
48th St
Lido Sands Dr
W Balboa Blvd
47th St
46th St
W Oceanfront
Balboa Cove
Channel Pl
43rd St
1
© 2009 Tele Atlas
Google

ATTACHMENT 2

WATER QUALITY TREATMENT PLAN

OPTIONS 1 AND 2

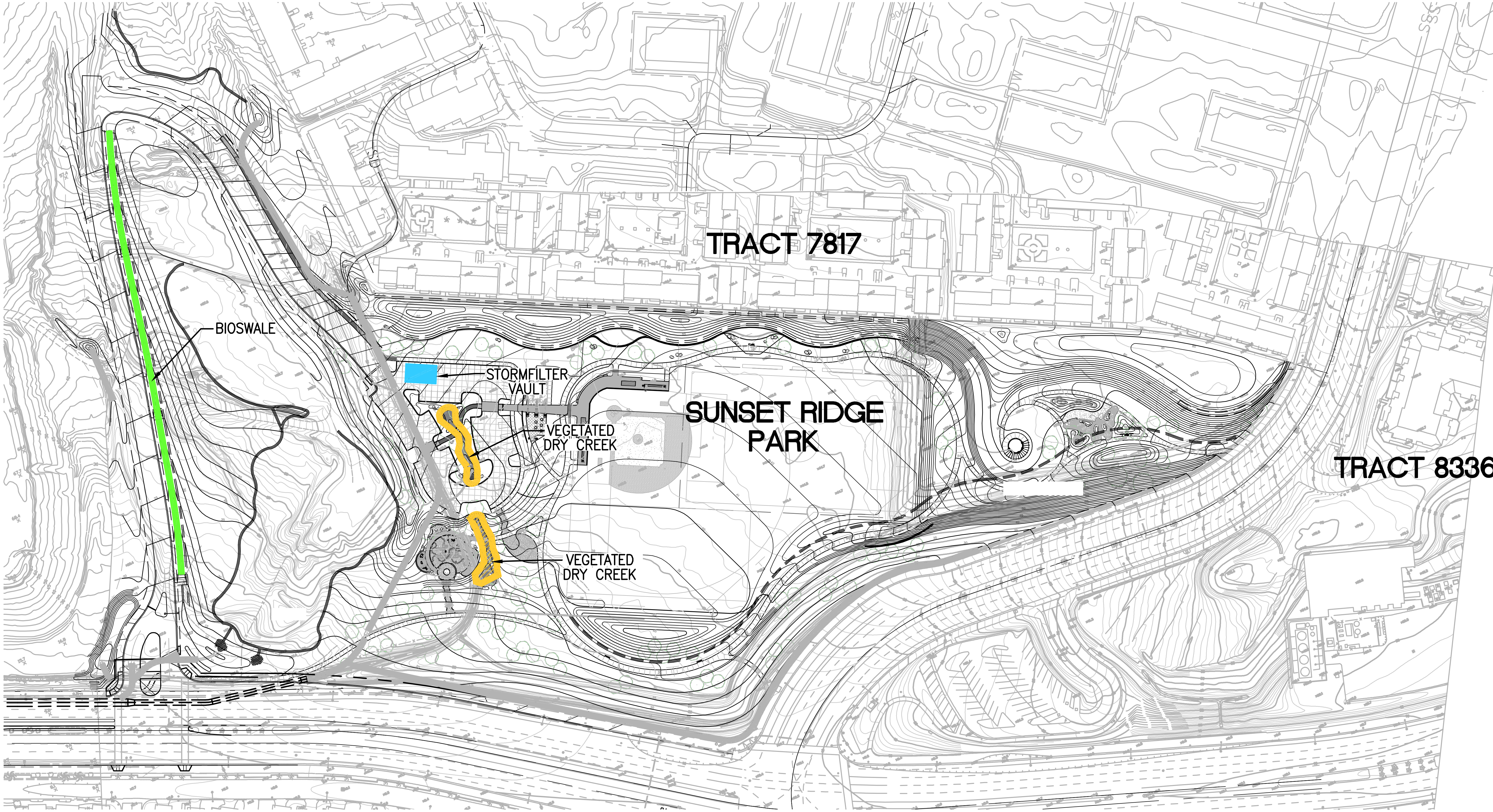


WATER QUALITY TREATMENT EXHIBIT - OPTION 1

SCALE: 1" = 150'

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS

23 MAUCHLY, SUITE 110
IRVINE, CA 92618
949-727-9095 PHONE
949-727-9098 FAX



WATER QUALITY TREATMENT EXHIBIT - OPTION 2

SCALE: 1" = 150'

URBAN RESOURCE
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ATTACHMENT 3

BEST MANAGEMENT PRACTICES FOR
NEW DEVELOPMENT INCLUDING
NON-RESIDENTIAL CONSTRUCTION SITES
(TABLES 1 AND 2 ONLY)

TABLE 1: APPROPRIATE NONSTRUCTURAL BMPS

Appropriate Nonstructural BMPs		Residential	Industrial	Retail/Office Center	Restaurants/ Warehouse/ Grocery	Fuel Dispensing	Vehicle Repair/ Maintenance
Homeowner/Tenant Education	(N1)	X	X	X			
Activity Restrictions	(N2)		X	X	X	X	X
Common Area Landscape Management	(N3)	X	X	X			
BMP Maintenance	(N4)	X	X	X	X	X	X
Title 22 CCR Compliance	(N5)		X			X	X
Local Industrial Permit Compliance	(N6)		X			X	
Spill Contingency Plan	(N7)		X			X	X
Underground Storage Tank Compliance	(N8)		X			X	
Haz-Mat Disclosure Compliance	(N9)		X			X	X
Uniform Fire Code Implementation	(N10)		X			X	X
Litter Control	(N11)	X	X	X	X	X	X
Employee Training	(N12)		X	X	X	X	X
Housekeeping of Loading Docks	(N13)		X		X		
Catchbasin Inspection	(N14)	X	X	X	X	X	X
Private Street/Lot Sweeping	(N15)	X	X	X			
Commercial Vehicle Washing	(N16)		X				X

○ = BMP APPLICABLE TO THIS WQMP

TABLE 2: ROUTINE STRUCTURAL BMPS							
Appropriate Structural BMPs		**Residential & Parks**	**Industrial**	**Retail/Office Center**	**Restaurants/ Warehouse/ Grocery**	**Fuel Dispensing**	**Vehicle Repair/ Maintenance**
Filtration	**(S1)**	**X**	**X**	**X**	**X**		
Common Area Efficient Irrigation	**(S2)**	**X**	**X**	**X**			
Common Area Runoff-Minimizing Landscape	**(S3)**	**X**	**X**	**X**			
Community Car Wash Racks	**(S4)**	**X**					
Wash Water Controls For Food Preparation Areas	**(S5)**				**X**		
Trash Container (Dumpster) Areas	**(S6)**		**X**		**X**	**X**	**X**
Self-Contained Areas for Washing/Steam Cleaning/Repair/Mat. Processing	**(S7)**		**X**				**X**
Outdoor Storage	**(S8)**		**X**				
Concrete Fuel Dispensing Area	**(S9)**					**X**	
Extended Fuel Dock Canopy	**(S10)**					**X**	
Interr. Flow from Motor Fuel Dispensing Areas	**(S11)**					**X**	
Energy Dissipators	**(S12)**	**X**	**X**	**X**			
Catchbasin Stenciling	**(S13)**	**X**	**X**	**X**			
Diversion of Loading Dock Drainage	**(S14)**				**X**		
Inlet Trash Racks	**(S15)**	**X**	**X**	**X**			
Water Quality Inlets	**(S16)**		**X**		**X**	**X**	**X**

○ = BMP APPLICABLE TO THIS WQMP

ATTACHMENT 4

EDUCATIONAL MATERIALS

A. "After the Storm" - U.S.E.P.A. Publication

B. “The Ocean Begins at Your Front Door” Brochure

C. "Protecting Water Quality from Urban Runoff” - U.S.E.P.A. Publication

D. "Proper Disposal of Household Hazardous Waste" Brochure

E. "Keeping Pest Control Products Out of Creeks, Rivers, and The Ocean" Brochure

F. "When it Rains, It Drains” Brochure

G. "The Solution to Stormwater Pollution" - U.S.E.P.A. Publication

H. “Tips for Pet Care” Brochure

I. “Household Tips” Brochure

ATTACHMENT 4A

"AFTER THE STORM"

U.S.E.P.A. PUBLICATION

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

After the Storm

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.

- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems

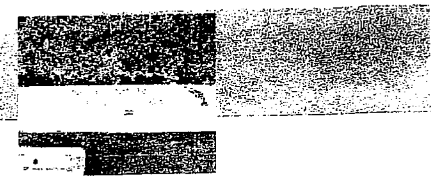
Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

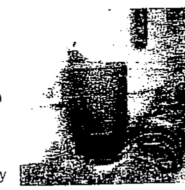
- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.



Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

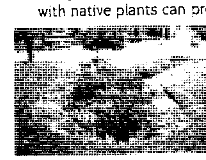
Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

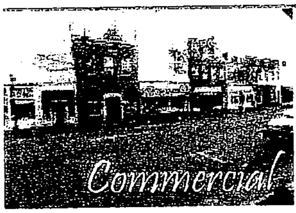


Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.



Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.



Commercial

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Construction

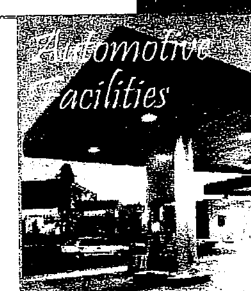
Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.

Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.



Automotive Facilities

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

ATTACHMENT 4B

"THE OCEAN BEGINS AT YOUR DOOR" BROCHURE

For More Information

California Environmental Protection Agency
www.calepa.ca.gov

- **Air Resources Board**
  www.arb.ca.gov
- **Department of Pesticide Regulation**
  www.cdpr.ca.gov
- **Department of Toxic Substances Control**
  www.dtsc.ca.gov
- **Integrated Waste Management Board**
  www.ciwmb.ca.gov
- **Office of Environmental Health Hazard Assessment**
  www.oehha.ca.gov
- **State Water Resources Control Board**
  www.waterboards.ca.gov

Earth 911 - community-specific environmental information
1-800-cleanup or visit www.1800cleanup.org

Health Care Agency's Ocean and Bay Water Closure and Posting Hotline
714-433-6400 or visit www.ocbeachinfo.com

Integrated Waste Management/Dept. of Orange County- information on household hazardous waste collection centers, recycling centers and solid waste collection
714-834-6752 or visit www.oclandfills.com

O.C. Agriculture Commissioner
714-447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

UC Master Gardener Hotline
714-708-1646 or visit www.uccemg.org

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements. To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

Orange County Stormwater Program

Aliso Viejo	(949) 425-2535
Anaheim Public Works Operations	(714) 765-6860
Brea Engineering	(714) 990-7666
Buena Park Public Works	(714) 562-3655
Costa Mesa Public Services	(714) 754-5323
Cypress Public Works	(714) 229-6740
Dana Point Public Works	(949) 248-3584
Fountain Valley Public Works	(714) 593-4441
Fullerton Engineering Dept	(714) 738-6853
Garden Grove Public Works	(714) 741-5956
Huntington Beach Public Works	(714) 536-5431
Irvine Public Works	(949) 724-6315
La Habra Public Services	(562) 905-9792
La Palma Public Works	(714) 690-3310
Laguna Beach Water Quality	(949) 497-0378
Laguna Hills Public Service	(949) 707-2650
Laguna Niguel Public Works	(949) 362-4337
Laguna Woods Public Works	(949) 639-0500
Lake Forest Public Works	(949) 461-3480
Los Alamitos Community Dev	(562) 431-3538
Mission Viejo Public Works	(949) 470-3056
Newport Beach, Code & Water Quality Enforcement	(949) 644-3215
Orange Public Works	(714) 532-6480
Placentia Public Works	(714) 993-8245
Rancho Santa Margarita	(949) 635-1800
San Clemente Environmental Programs	(949) 361-6143
San Juan Capistrano Engineering	(949) 234-4413
Santa Ana Public Works	(714) 647-3380
Seal Beach Engineering	(562) 431-2527 x317
Stanton Public Works	(714) 379-9222 x204
Tustin Public Works Engineering	(714) 573-3150
Villa Park Engineering	(714) 998-1500
Westminster Public Works Engineering	(714) 898-3311 x446
Yorba Linda Engineering	(714) 961-7138
Orange County Stormwater Program	(714) 567-6363

Orange County 24-Hour
Water Pollution Problem Reporting Hotline
(714)-567-6363

On-line Water Pollution Problem Reporting form
www.ocwatersheds.com

The Ocean Begins at Your Front Door

Even if you live miles from the Pacific Ocean, you may be unknowingly polluting it.

Did You Know?

- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact the largest source of water pollution comes from city streets, neighborhoods, construction sites, and parking lots. This type of pollution is sometimes called "non-point source" pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff refers to runoff resulting from rainfall. It is very noticeable during heavy rainstorms when large volumes of water drain off the urban landscape picking up pollutants along the way.
- Urban runoff can happen anytime of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers, and cleaners – can be blown or washed into the storm drains.
- A little water from a garden hose or rain can also send materials into the storm drains.
- Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets) water in the storm drains is not treated before entering our waterways.

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating, and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.

The Effect on the Ocean

Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed by the Orange County Stormwater Program under National Pollutant Discharge Elimination System (NPDES) permits. The program educates and encourages the public to protect water quality, monitor runoff in the storm drain system, manage NPDES permit process for municipalities, investigate illegal disposals, and maintain storm drains.

The support of Orange County residents, businesses and industries is needed to improve water quality and reduce the threat of stormwater and urban runoff pollution. Proper use and disposal of materials we use everyday will help stop this form of pollution before it reaches the storm drain and the ocean.

Dumping one quart of motor oil into a storm drain can contaminate 250,000 gallons of water.

The Ocean Begins at Your Front Door

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products, and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste collection center.
- For a household hazardous waste collection center near you call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of in trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor vehicle for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and be free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- Whenever possible, drain dechlorinated pool and spa water directly into the sanitary sewer but only when it is not raining.
- Some cities may have ordinances that do not allow pool water to be disposed into the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. For locations and hours of Household Hazardous Waste Collection Centers call 714-834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a Household Hazardous Waste Collection Center.

Common Pollutants

Home Maintenance
- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

Lawn and Garden
- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile
- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

ATTACHMENT 4C

"PROTECTING WATER QUALITY FROM URBAN RUNOFF"

U.S.E.P.A. PUBLICATION

United States
Environmental Protection
Agency

EPA 841-F-03-003

Protecting Water Quality *from* URBAN RUNOFF

Clean Water Is Everybody's Business

In urban and suburban areas, much of the land surface is covered by buildings and pavement, which do not allow rain and snowmelt to soak into the ground. Instead, most developed areas rely on storm drains to carry large amounts of runoff from roofs and paved areas to nearby waterways. The stormwater runoff carries pollutants such as oil, dirt, chemicals, and lawn fertilizers directly to streams and rivers, where they seriously harm water quality. To protect surface water quality and groundwater resources, development should be designed and built to minimize increases in runoff.

The most recent National Water Quality Inventory reports that runoff from urbanized areas is the leading source of water quality impairments to surveyed estuaries and the third-largest source of impairments to surveyed lakes.

Did you know that because of impervious surfaces like pavement and rooftops, a typical city block generates more than 5 times more runoff than a woodland area of the same size?

How Urbanized Areas Affect Water Quality

Increased Runoff

The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands traps rainwater and snowmelt and allows them to filter slowly into the ground. In contrast, impervious (nonporous) surfaces like roads, parking lots, and rooftops prevent rain and snowmelt from infiltrating, or soaking, into the ground. Most of the rainfall and snowmelt remains above the surface, where it runs off rapidly in unnaturally large amounts.

Storm sewer systems concentrate runoff into smooth, straight conduits. This runoff gathers speed and erosional power as it travels underground. When this runoff leaves the storm drains and empties into a stream, its excessive volume and power blast out streambanks, damaging streamside vegetation and wiping out aquatic habitat. These increased storm flows carry sediment loads from construction sites and other denuded surfaces and eroded streambanks. They often carry higher water temperatures from streets, roof tops, and parking lots, which are harmful to the health and reproduction of aquatic life.

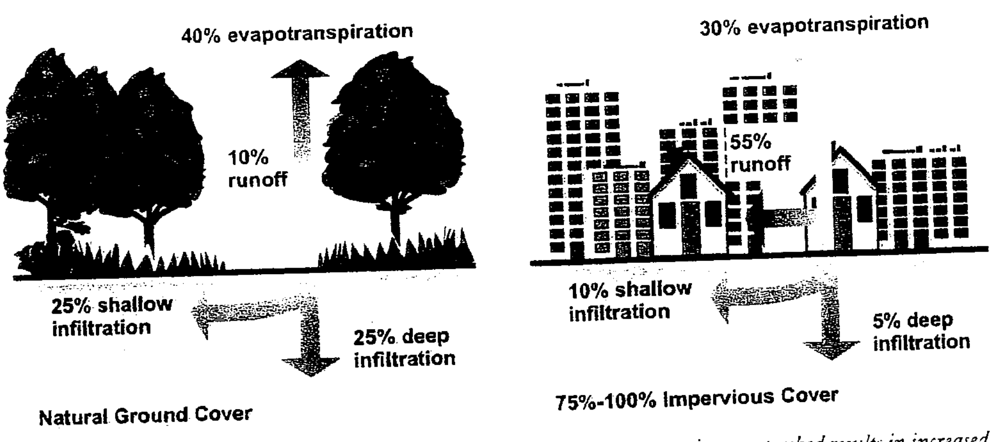
The loss of infiltration from urbanization may also cause profound groundwater changes. Although urbanization leads to great increases in flooding during and immediately after wet weather, in many instances it results in lower stream flows during dry weather. Many native fish and other aquatic life cannot survive when these conditions prevail.

Increased Pollutant Loads

Urbanization increases the variety and amount of pollutants carried into streams, rivers, and lakes. The pollutants include:

- Sediment
- Oil, grease, and toxic chemicals from motor vehicles
- Pesticides and nutrients from lawns and gardens
- Viruses, bacteria, and nutrients from pet waste and failing septic systems
- Road salts
- Heavy metals from roof shingles, motor vehicles, and other sources
- Thermal pollution from dark impervious surfaces such as streets and rooftops

These pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe and unpleasant.



Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface ruunoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.

Managing Urban Runoff

What Homeowners Can Do

To decrease polluted runoff from paved surfaces, households can develop alternatives to areas traditionally covered by impervious surfaces. Porous pavement materials are available for driveways and sidewalks, and native vegetation and mulch can replace high maintenance grass lawns. Homeowners can use fertilizers sparingly and sweep driveways, sidewalks, and roads instead of using a hose. Instead of disposing of yard waste, they can use the materials to start a compost pile. And homeowners can learn to use Integrated Pest Management (IPM) to reduce dependence on harmful pesticides.

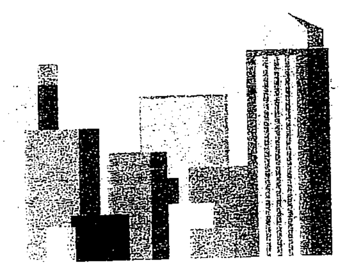
In addition, households can prevent polluted runoff by picking up after pets and using, storing, and disposing of chemicals properly. Drivers should check their cars for leaks and recycle their motor oil and antifreeze when these fluids are changed. Drivers can also avoid impacts from car wash runoff (e.g., detergents, grime, etc.) by using car wash facilities that do not generate runoff. Households served by septic systems should have them professionally inspected and pumped every 3 to 5 years. They should also practice water conservation measures to extend the life of their septic systems.

Controlling Impacts from New Development

Developers and city planners should attempt to control the volume of runoff from new development by using low impact development, structural controls, and pollution prevention strategies. Low impact development includes measures that conserve natural areas (particularly sensitive hydrologic areas like riparian buffers and infiltrable soils); reduce development impacts; and reduce site runoff rates by maximizing surface roughness, infiltration opportunities, and flow paths.

Controlling Impacts from Existing Development

Controlling runoff from existing urban areas is often more costly than controlling runoff from new developments. Economic efficiencies are often realized through approaches that target "hot spots" of runoff pollution or have multiple benefits, such as high-efficiency street sweeping (which addresses aesthetics, road safety, and water quality). Urban planners and others responsible for managing urban and suburban areas can first identify and implement pollution prevention strategies and examine source control opportunities. They should seek out priority pollutant reduction opportunities, then protect natural areas that help control runoff, and finally begin ecological restoration and retrofit activities to clean up degraded water bodies. Local governments are encouraged to take lead roles in public education efforts through public signage, storm drain marking, pollution prevention outreach campaigns, and partnerships with citizen groups and businesses. Citizens can help prioritize the clean-up strategies, volunteer to become involved in restoration efforts, and mark storm drains with approved "don't dump" messages.



Related Publications

Turn Your Home into a Stormwater Pollution Solution!
www.epa.gov/nps

This web site links to an EPA homeowner's guide to healthy habits for clean water that provides tips for better vehicle and garage care, lawn and garden techniques, home improvement, pet care, and more.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas
www.epa.gov/owow/nps/urbanmm

This technical guidance and reference document is useful to local, state, and tribal managers in implementing management programs for polluted runoff. Contains information on the best available, economically achievable means of reducing pollution of surface waters and groundwater from urban areas.

Onsite Wastewater Treatment System Resources
www.epa.gov/owm/onsite

This web site contains the latest brochures and other resources from EPA for managing onsite wastewater treatment systems (OWTS) such as conventional septic systems and alternative decentralized systems. These resources provide basic information to help individual homeowners, as well as detailed, up-to-date technical guidance of interest to local and state health departments.

Low Impact Development Center
www.lowimpactdevelopment.org

This center provides information on protecting the environment and water resources through integrated site design techniques that are intended to replicate preexisting hydrologic site conditions.

Stormwater Manager's Resource Center (SMRC)
www.stormwatercenter.net

Created and maintained by the Center for Watershed Protection, this resource center is designed specifically for stormwater practitioners, local government officials, and others that need technical assistance on stormwater management issues.

Strategies: Community Responses to Runoff Pollution
www.nrdc.org/water/pollution/storm/stoinx.asp

The Natural Resources Defense Council developed this interactive web document to explore some of the most effective strategies that communities are using around the nation to control urban runoff pollution. The document is also available in print form and as an interactive CD-ROM.

For More Information

U.S. Environmental Protection Agency
Nonpoint Source Control Branch (4503T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
www.epa.gov/nps

February 2003

ATTACHMENT 4D

"PROPER DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE" BROCHURE

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of household hazardous waste can lead to water pollution. Batteries, electronics, paint, oil, gardening chemicals, cleaners and other hazardous materials cannot be thrown in the trash. They also must never be poured or thrown into yards, sidewalks, driveways, gutters or streets. Rain or other water could wash the materials into the storm drain and eventually into our waterways and the ocean. In addition, hazardous waste must not be poured in the sanitary sewers (sinks and toilets).

NEVER DISPOSE OF HOUSEHOLD HAZARDOUS WASTE IN THE TRASH, STREET, GUTTER, STORM DRAIN OR SEWER.

For more information,
please call the
Orange County Stormwater Program
at **(714) 567-6363**
or visit
www.ocwatersheds.com

To Report Illegal Dumping of Household Hazardous Waste call 1-800-69-TOXIC

To report a spill,
call the
Orange County 24-Hour Water Pollution Problem Reporting Hotline (714) 567-6363.

For emergencies, dial 911.

RECYCLE USED OIL

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

ORANGE COUNTY

Pollution Prevention

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." HHW can be found throughout your home, including the bathroom, kitchen, laundry room and garage.

WHEN POSSIBLE, USE NON-HAZARDOUS OR LESS-HAZARDOUS PRODUCTS.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe.

Proper disposal of HHW is actually easy. Simply drop them off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. Many materials including anti-freeze, latex-based paint, motor oil and batteries can be recycled. Some centers have a "Stop & Swap" program that lets you take partially used home, garden, and automobile products free of charge. There are four HHWCCs in Orange County:

Anaheim:..................1071 N. Blue Gum St
Huntington Beach:.........17121 Nichols St
Irvine:............................6411 Oak Canyon
San Juan Capistrano:... 32250 La Pata Ave

Centers are open Tuesday-Saturday, 9 a.m.-3 p.m. Centers are closed on rainy days and major holidays. For more information, call **(714) 834-6752** or visit **www.oclandfills.com.**

Common household hazardous wastes

- Batteries
- Paint and paint products
- Adhesives
- Drain openers
- Household cleaning products
- Wood and metal cleaners and polishes
- Pesticides
- Fungicides/wood preservatives
- Automotive products (antifreeze, motor oil, fluids)
- Grease and rust solvents
- Fluorescent lamps
- Mercury (thermometers & thermostats)
- All forms of electronic waste including computers and microwaves
- Pool & spa chemicals
- Cleaners
- Medications
- Propane (camping & BBQ)
- Mercury-containing lamps
- Television & monitors (CRTs, flatscreens)

Tips for household hazardous waste

- Never dispose of HHW in the trash, street, gutter, storm drain or sewer.
- Keep these materials in closed, labeled containers and store materials indoors or under a cover.
- When possible, use non-hazardous products.
- Reuse products whenever possible or share with family and friends.
- Purchase only as much of a product as you'll need. Empty containers may be disposed of in the trash.
- HHW can be harmful to humans, pets and the environment. Report emergencies to 911.

ATTACHMENT 4E

"KEEPING PEST CONTROL PRODUCTS OUT OF CREEKS, RIVERS, AND THE OCEAN" BROCHURE

This brochure is being distributed in order to reduce the impacts of pesticides on water quality. It was produced with support from the Orange County Storm Water Program, the Coalition for Urban/Rural Environmental Stewardship (CURES) and a 319(h) grant from the State Water Resources Control Board.

Orange County Storm Water Program Participants:

Anaheim Public Works/Engineering	(714) 765-5176
Brea Engineering	(714) 990-7666
Buena Park Public Works	(714) 562-3655
Costa Mesa Public Services	(714) 754-5248
Cypress Engineering	(714) 229-6752
Dana Point Public Works	(949) 248-3562
Fountain Valley Public Works	(714) 593-4400 x347
Fullerton Engineering Dept	(714) 738-6853
Garden Grove Development Services	(714) 741-5554
Huntington Beach Public Works	(714) 536-5432
Irvine Public Works	(949)724-6515
La Habra Public Services	(562) 905-9792
La Palma Public Works	(714) 523-1140 x102
Laguna Beach Municipal Services	(949) 497-0711
Laguna Hills Engineering	(949) 707-2600
Laguna Niguel Public Works	(949) 362-4337
Lake Forest Public Works	(949) 461-3480
Los Alamitos Community Dev	(562) 431-3538 x301
Mission Viejo Public Works	(949) 470-3095
Newport Beach Public works	(949) 644-3311
Orange Public Works	(714) 744-5551
Placentia Engineering	(714) 993-8131
San Clemente Engineering	(949) 361-6100
San Juan Capistrano Engineering	(949) 493-1171
Santa Ana Public Works	(714) 647-3380
Seal Beach Engineering	(562) 431-2527 x318
Stanton Public Works	(714) 379-9222 x204
Tustin Public Works Engineering	(714) 573-3150
Villa Park Engineering	(714) 998-1500
Westminster Public Works Eng.	(714) 898-3311 x215
Yorba Linda Engineering	(714) 961-7170 x174
O.C. Storm Water Program	(714) 567-6363
24 Hour Water Pollution Hotline	(714) 567-6363 or ashbyk@pfrd.co.orange.ca.us

Chemical and Hazardous Material Spill Emergencies 911

Other Important Phone Numbers:

For Additional Brochures .... (714) 567-6363

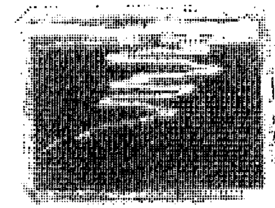
UC Masters & Coop Extension .... (714) 708-1646
ucmastergardeners@yahoo.com

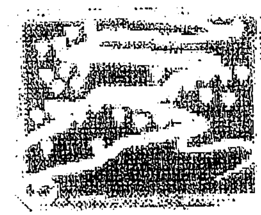
O.C. Household Hazardous Waste Information .... (714) 834-6752
or www.oc.ca.gov/IWMD

Information on agriculture chemicals, pesticides and possible alternatives, O.C. Agriculture Commissioner .... (714) 447-7115

Original graphics developed with support from:
Coalition For Urban/Rural Environmental Stewardship (CURES)
Western Crop Protection Association (WCPA)
Responsible Industry for a Sound Environment (RISE)

Keeping Pest Control Products Out of Creeks, Rivers and The Ocean





HOMEOWNER TIPS

PROTECTING WATER

HOMEOWNER TIPS

PROTECTING WATER

Before Buying Pest Control Products

- Identify the pest.
- Decide if pest control products are the best control measure or if there are alternatives available.
- Are integrated pest management guidelines available for this pest?
- Read the product label:
  Is the pest listed on the label?
  Is it the best product for the pest?

Before Mixing Your Sprayer

- Read the label carefully.
- Buy only enough pesticide to treat the area affected by the pest.
- Check the weather and don't apply if it's windy or about to rain
- Measure the area you're treating.
- Calculate how much spray to mix.
- Wear long sleeve shirt, long pants, shoes and any other protective equipment listed on the label and follow all the label precautions.
- Be prepared for spills and know how to clean them up.

When You're Ready To Spray

- Mix and load spray in an area where any spilled pesticide will not be able to drain or be washed away into storm drains, ditches, streams, ponds or other bodies of water.
- Mix sprayer on grass, not the sidewalk or driveway.
- Mix only as much as needed.

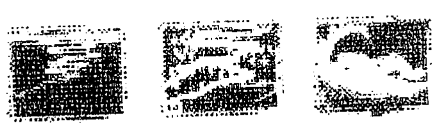
When You're Spraying

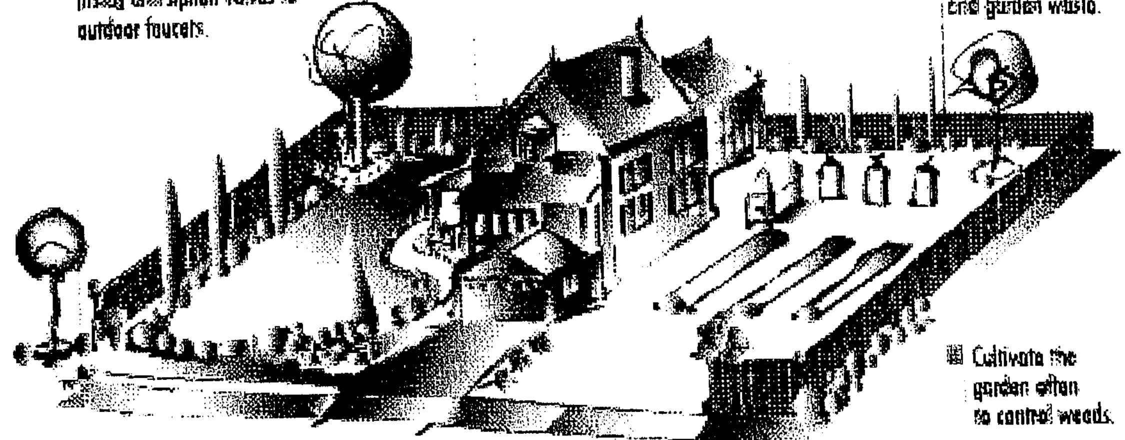
- AVOID spraying in or near storm drains, ditches, streams, and ponds!
- Leave an untreated strip around these areas to protect the water.

When You're done

- Never dump leftovers down any drain; Save for a future application.
- Triple-rinse sprayer and apply rinsewater to treated area.
- Take any old or unwanted pesticides to a Household Hazardous Waste Collection Center (714) 834-6752.

Using Pest Control Products. It's Your Responsibility To Do It Right!



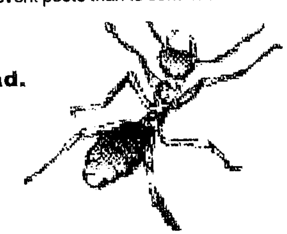


IPM... OUTSMARTING PESTS WHILE PROTECTING WATER

With Integrated Pest Management (IPM), homeowners use common sense and nature to make it difficult for pests to survive. IPM techniques include cultural practices (such as mulching to prevent weeds), encouraging natural enemies (good bugs), and judicious use of pest control products.

- First, identify your pest problem. To find the best solution, you need to pin down the problem. Consult gardening books, your county cooperative extension office or your local nursery.
- Decide how much pest control is necessary. If you can live with some pest damage, you can avoid intensive pest control product treatments.
- Choose an effective option. Try various types of controls first: washing bugs off plants, pruning diseased parts of plants. If you need to use pest control products, choose one that targets the problem and poses the least hazard.
- Finally, it's easier to prevent pests than to control them.

Think ahead.



ATTACHMENT 4F

"WHEN IT RAINS, IT DRAINS" BROCHURE

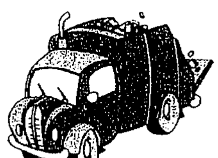
What is Storm Water?

Storm water is water from precipitation that flows across the ground and pavement when it rains or when snow and ice melt. The water seeps into the ground or drains into what we call storm sewers. These are the drains you see at street corners or at low points on the sides of streets. Collectively, the draining water is called storm water runoff.

Why is Storm Water "Good Rain Gone Wrong?"

Storm water becomes a problem when it picks up debris, chemicals, dirt, and other pollutants as it flows or when it causes flooding and erosion of stream banks. Storm water travels through a system of pipes and roadside ditches that make up storm sewer systems. It eventually flows directly to a lake, river, stream, wetland, or coastal water. All of the pollutants storm water carries along the way empty into our waters, too, because storm water does not get treated!

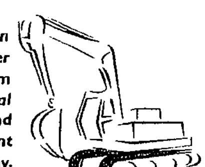
Pet wastes left on the ground get carried away by storm water, contributing harmful bacteria, parasites and viruses to our water.



Vehicles drip fluids (oil, grease, gasoline, antifreeze, brake fluids, etc.) onto paved areas where storm water runoff carries them through our storm drains and into our water.

Chemicals used to grow and maintain beautiful lawns and gardens, if not used properly, can run off into the storm drains when it rains or when we water our lawns and gardens.

Waste from chemicals and materials used in construction can wash into the storm sewer system when it rains. Soil that erodes from construction sites causes environmental degradation, including harming fish and shellfish populations that are important for recreation and our economy.



Where To Go To Continue the Information Flow

Your community is preventing storm water pollution through a storm water management program. This program addresses storm water pollution from construction, new development, illegal dumping to the storm sewer system, and pollution prevention and good housekeeping practices in municipal operations. It will also continue to educate the community and get everyone involved in making sure the only thing that storm water contributes to our water is . . . water! Contact your community's storm water management program coordinator or the Pennsylvania Department of Environmental Protection for more information about storm water management.

Pennsylvania Department of Environmental Protection
www.dep.state.pa.us

Answers to Test Your Storm Sewer System Savvy:

1. Ditch – Part of the storm sewer system. Most people think that the system is just a series of underground pipes. It can also include ditches used to convey storm water from the land to a receiving lake, river, or stream.

2. Fire Hydrant – Not part of the storm sewer system. Water sprayed from fire hydrants is not storm water, but is allowed by law to enter the storm sewer system.

3. Curb with Storm Drain Inlet – Part of the storm sewer system. Many people do not realize that this is an opening leading to the storm sewer system. Anything going into this inlet (e.g., trash, leaves, improperly disposed of hazardous materials) travel directly to a receiving lake, river, or stream without being treated first. Many communities stencil storm drains with "Do Not Dump" messages to let people know.

4. Storm Sewer Outfall – Part of the storm sewer system. An outfall is where storm water drains from the storm sewer system into a receiving lake, stream, or river. If there is a flow from an outfall when it isn't raining, there could be a problem with the system or someone has used a storm drain for illegally disposing of materials.

5. Toilet – Not part of the storm sewer system. Wastewater from sinks and toilets in houses and businesses travel through a sewer system constructed to carry sanitary wastes. In some instances, older communities may have a combined sewer system designed to carry both storm water and sanitary waste.

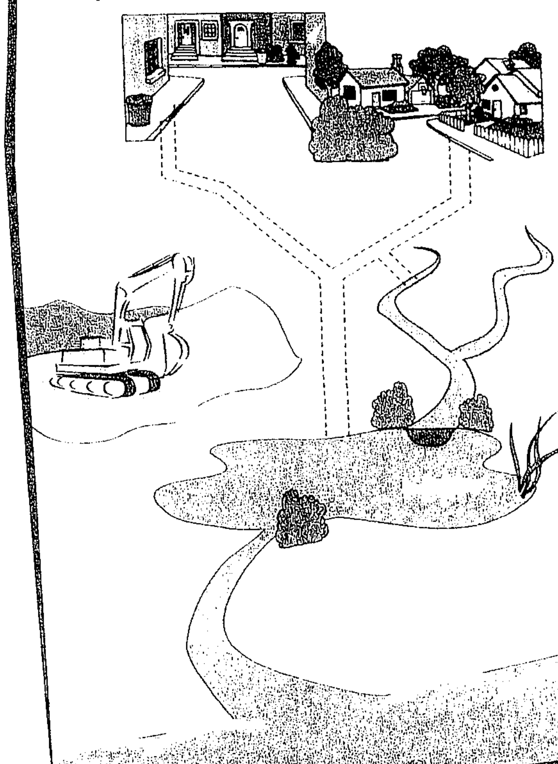
6. Septic System – Not part of the storm sewer system. Homeowners use septic tanks to manage sanitary wastes on-site. Improperly maintained septic systems can leak and contribute pollutants to the storm sewer system, as well as directly to lakes, rivers, and streams.

7. Roads and Other Paved Areas – Not part of the storm sewer system. Roads and other hardened surfaces such as parking lots and sidewalks can accumulate pollutants (e.g., oil, grease, dirt, leaves, trash, pet wastes) that storm water eventually washes into the storm sewer system.

8. Storm Drain Inlet – Part of the storm sewer system. This is another example of what a storm drain may look like. Like the storm drain inlet shown in picture #3, anything that enters this drain will go directly to streams, rivers, and lakes without being treated first. It is important to recognize this as a storm drain to prevent it from being used as a trash can.

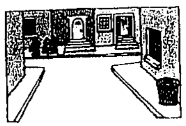
When It Rains, It Drains

Understanding Storm Water and How It Can Affect Your Money, Safety, Health, and the Environment

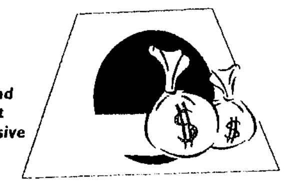


What Happens When It Rains?

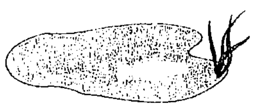
Rain is an important part of nature's water cycle, but there are times it can do more damage than good. Problems related to storm water runoff can include:



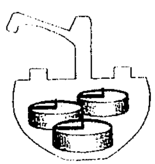
Flooding caused by too much storm water flowing over hardened surfaces such as roads and parking lots, instead of soaking into the ground.



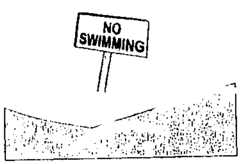
Increases in spending on maintaining storm drains and the storm sewer system that become clogged with excessive amounts of dirt and debris.



Decreases in sportfish populations because storm water carries sediment and pollutants that degrade important fish habitat.



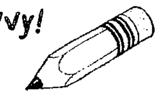
More expensive treatment technologies to remove harmful pollutants carried by storm water into our drinking water supplies.



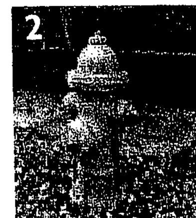
Closed beaches due to high levels of bacteria carried by storm water that make swimming unsafe.

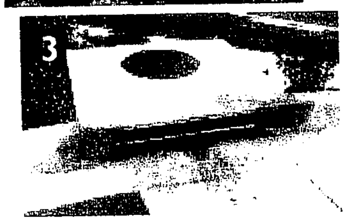
We can help rain restore its good reputation while protecting our health and environment while saving money for ourselves and our community. Keep reading to find out how...

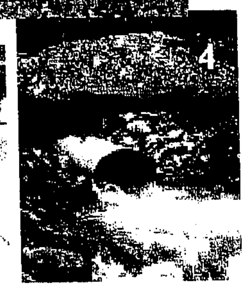
Test Your Storm Sewer System Savvy!

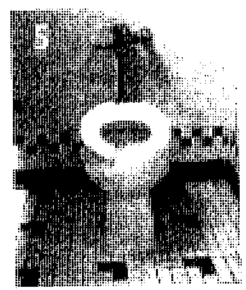


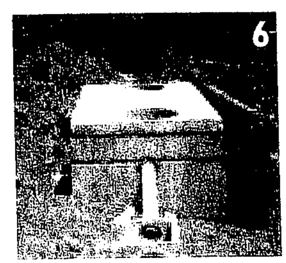
What does the storm sewer system look like in your community? See if you can identify which pictures are part of the storm sewer system. (Answers are on the back.)

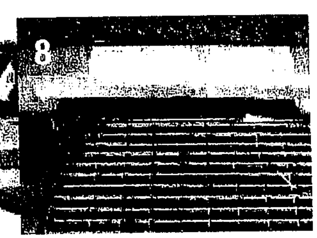












Restoring Rain's Reputation: What Everyone Can Do To Help

Rain by nature is important for replenishing drinking water supplies, recreation, and healthy wildlife habitats. It only becomes a problem when pollutants from our activities like car maintenance, lawn care, and dog walking are left on the ground for rain to wash away. Here are some of the most important ways to prevent storm water pollution:

Properly dispose of hazardous substances such as used oil, cleaning supplies and paint—never pour them down any part of the storm sewer system and report anyone who does.

Use pesticides, fertilizers, and herbicides properly and efficiently to prevent excess runoff.

Look for signs of soil and other pollutants, such as debris and chemicals, leaving construction sites in storm water runoff or tracked into roads by construction vehicles. Report poorly managed construction sites that could impact storm water runoff to your community. (See the back of this brochure for contact information.)

Install innovative storm water practices on residential property, such as rain barrels or rain gardens, that capture storm water and keep it on site instead of letting it drain away into the storm sewer system.

Report any discharges from storm water outfalls during times of dry weather—a sign that there could be a problem with the storm sewer system.

Pick up after pets and dispose of their waste properly. No matter where pets make a mess—in a backyard or at the park—storm water runoff can carry pet waste from the land to the storm sewer system to a stream.

Store materials that could pollute storm water indoors and use containers for outdoor storage that do not rust or leak to eliminate exposure of materials to storm water.

ATTACHMENT 4G

"THE SOLUTION TO STORMWATER POLLUTION"

U.S.E.P.A. PUBLICATION

Pet Care

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Swimming Pool and Spa

- Drain your swimming pool only when a test kit does not detect chlorine levels.
- Whenever possible, drain your pool or spa into the sanitary sewer system.
- Properly store pool and spa chemicals to prevent leaks and spills, preferably in a covered area to avoid exposure to stormwater.

Septic System Use and Maintenance

- Have your septic system inspected by a professional at least every 3 years, and have the septic tank pumped as necessary (usually every 3 to 5 years).
- Care for the septic system drainfield by not driving or parking vehicles on it. Plant only grass over and near the drainfield to avoid damage from roots.
- Flush responsibly. Flushing household chemicals like paint, pesticides, oil, and antifreeze can destroy the biological treatment taking place in the system. Other items, such as diapers, paper towels, and cat litter, can clog the septic system and potentially damage components.

Storm drains connect to waterbodies!

Internet Address (URL) • HTTP://www.epa.gov
Recycled/Recyclable • Printed With Vegetable Oil Based Inks on 100% Postconsumer,
Process Chlorine Free Recycled Paper

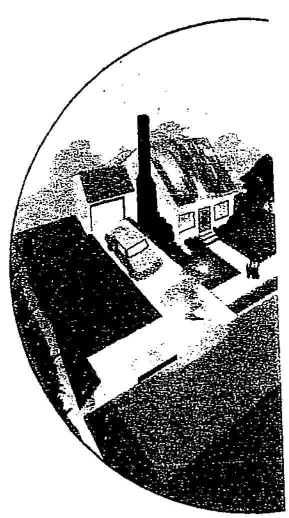
EPA 833-B-03-003
January 2003

Remember: Only rain down the drain!

For more information, visit
www.epa.gov/npdes/stormwater
or
www.epa.gov/nps

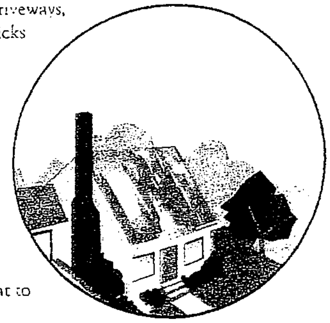
Make your home

The SOLUTION TO STORMWATER POLLUTION!



A homeowner's guide to healthy habits for clean water

As stormwater flows over driveways, lawns, and sidewalks, it picks up debris, chemicals, dirt, and other pollutants. Stormwater can flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water. Polluted runoff is the nation's greatest threat to clean water.

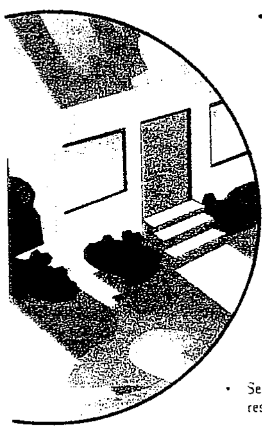


By practicing healthy household habits, homeowners can keep common pollutants like pesticides, pet waste, grass clippings, and automotive fluids off the ground and out of stormwater. Adopt these healthy household habits and help protect lakes, streams, rivers, wetlands, and coastal waters. Remember to share the habits with your neighbors!

Healthy Household Habits for Clean Water

Vehicle and Garage

- Use a commercial car wash or wash your car on a lawn or other unpaved surface to **minimize** the amount of dirty, soapy water flowing into the storm drain and eventually into your local waterbody.

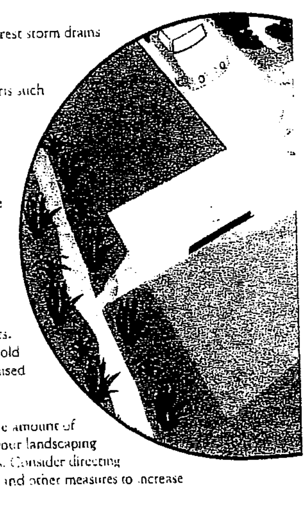


- Check your car, boat, motorcycle, and other machinery and equipment for leaks and spills. Make repairs as soon as possible. Clean up **spilled fluids** with an absorbent material like kitty litter or sand, and don't rinse the spills into a nearby storm drain. Remember to properly dispose of the absorbent material.
- **Recycle** used oil and other automotive fluids at participating service stations. Don't dump these chemicals down the storm drain or dispose of them in your trash.

Lawn and Garden

- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Avoid application if the forecast calls for rain; otherwise, chemicals will be washed into your local stream.
- Select **native** plants and grasses that are drought- and pest-resistant. Native plants require less water, fertilizer, and pesticides.
- **Sweep up** yard debris, rather than hosing down areas. Compost or recycle yard waste when possible.
- Don't overwater your lawn. Water during the **cool** times of the day, and don't let water run off into the storm drain.
- Cover piles of dirt and mulch being used in landscaping projects to prevent these pollutants from blowing or washing off your yard and into local waterbodies. **Vegetate** bare spots in your yard to prevent soil erosion.

Home Repair and Improvement



- Before beginning an outdoor project, locate the nearest storm drains and **protect** them from debris and other materials.
- **Sweep** up and properly dispose of construction debris such as concrete and mortar.
- Use hazardous substances like paints, solvents, and cleaners in the **smallest amounts possible**, and follow the directions on the label. Clean up spills immediately, and dispose of the waste safely. Store substances properly to avoid leaks and spills.
- Purchase and use **nontoxic, biodegradable, recycled,** and recyclable products whenever possible.
- **Clean** paint brushes in a sink, not outdoors. Filter and reuse paint thinner when using oil-based paints. Properly dispose of excess paints through a household hazardous waste collection program, or donate unused paint to local organizations.
- **Reduce** the amount of paved area and increase the amount of vegetated area in your yard. Use native plants in your landscaping to reduce the need for watering during dry periods. Consider directing downspouts away from paved surfaces onto lawns and other measures to increase infiltration and reduce polluted runoff.

ATTACHMENT 4H

"TIPS FOR PET CARE" BROCHURE

Clean beaches and healthy creeks, rivers, bays, [illegible] County. However, [illegible]

[illegible]

For more information, please call the Orange County Stormwater Program at (714) 567-6363 or visit www.ocwatersheds.com.

To report a spill, call the Orange County 24-Hour Water Pollution Reporting Hotline at (714) 567-6363.

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Help Prevent Ocean Pollution:

Tips for Pet Care

The Ocean Begins at Your Front Door

PROJECT POLLUTION PREVENTION

Tips for Pet Care

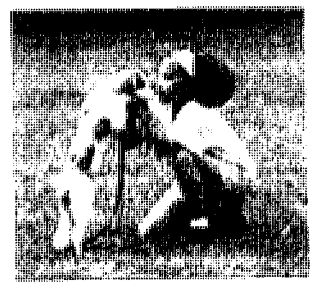
Never let any pet care products or washwater run off your yard and into the street or storm drain.

Washing Your Pets

- If possible, bathe your pets indoors using less-toxic shampoos or have your pet professionally groomed. Follow instructions on the products and clean up spills.
- If you must bathe your pet outside, wash it on your lawn or another absorbent, permeable surface to keep the washwater from running into the street or storm drain.
- Even biodegradable soaps and shampoos can be harmful to marine life and the environment.

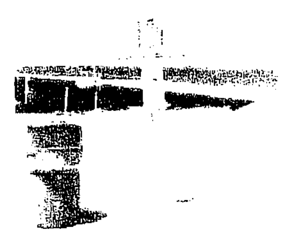
Flea Control

- Consider using oral or topical flea control products.
- If you use flea control products such as shampoos, sprays or collars, make sure to dispose of any unused products at a Household Hazardous Waste Collection Center.



Why You Should Pick Up After Your Pet

It's the law! Every city has an ordinance requiring you to pick up after your pet. Besides being a nuisance, pet waste can lead to water pollution, even if you live inland. During rainfall, pet waste left outdoors can wash into storm drains. This waste flows directly into our waterways and the ocean where it can harm human health, marine life and the environment.



As it decomposes, pet waste demands a high level of oxygen from water. This decomposition can contribute to killing marine life by reducing the amount of dissolved oxygen available to them.

Have fun with your pets, but please be a responsible pet owner by taking care of them and the environment.

- Take a bag with you on walks to pick up after your pet.
- Dispose of the waste in the trash or in a toilet.

ATTACHMENT 4I

"HOUSEHOLD TIPS" BROCHURE

Help Prevent Ocean Pollution:

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common household activities can lead to water pollution if you're not careful.

REMEMBER THE WATER IN YOUR STORM DRAIN IS NOT TREATED BEFORE IT ENTERS OUR WATERWAYS

Litter, oil, chemicals and other substances that are left on your yard or driveway can be blown or washed into storm drains that flow to the ocean. Over-watering your lawn and washing your car can also flush materials into the storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure to help prevent water pollution.

For more information, please call the Orange County Stormwater Program at (714) 567-6363 or visit www.ocwatersheds.com.

To report spills, call the Orange County 24-Hour Water Pollution Problem Reporting Hotline at (714) 567-6363.

For emergencies, call 911.

The tips contained in this brochure provide useful information to help prevent water pollution while performing everyday household activities. If you have other suggestions, please contact your city's stormwater representative or call the Orange County Stormwater Program.

GENUINE RECYCLED PAPER

RECYCLE USED OIL

PROJECT Pollution PREVENTION

Pollution Prevention

Household Activities

- **Do not rinse spills with water!** Sweep outdoor spills and dispose of in the trash. For wet spills like oil, apply cat litter or another absorbent material, then sweep and bring to a household hazardous waste collection center (HHWCC).
- Securely cover trash cans.
- Take household hazardous waste to a household hazardous waste collection center.
- Store household hazardous waste in closed, labeled containers inside or under a cover.
- Do not hose down your driveway, sidewalk or patio. Sweep up debris and dispose of in trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of in the trash.
- Bathe pets indoors or have them professionally groomed.

Household Hazardous Wastes include:

- **Batteries**
- **Paint thinners, paint strippers and removers**
- **Adhesives**
- **Drain openers**
- **Oven cleaners**
- **Wood and metal cleaners and polishes**
- **Herbicides and pesticides**
- **Fungicides/wood preservatives**
- **Automotive fluids and products**
- **Grease and rust solvents**
- **Thermometers and other products containing mercury**
- **Fluorescent lamps**
- **Cathode ray tubes, e.g. TVs, computer monitors**
- **Pool and spa chemicals**

Gardening Activities

- Follow directions on pesticides and fertilizers, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Water your lawn and garden by hand to control the amount of water you use. Set irrigation systems to reflect seasonal water needs. If water flows off your yard and onto your driveway or sidewalk, your system is over-watering.
- Mulch clippings or leave them on the lawn. If necessary, dispose in a green waste container.
- Cultivate your garden often to control weeds.

Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled "non-toxic," "phosphate free" or "biodegradable." Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.
- Do not use acid-based wheel cleaners and "hose off" engine degreasers at home. They can be used at a commercial facility which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800CLEANUP.ORG.

For locations and hours of Household Hazardous Waste Collection Centers in Anaheim, Huntington Beach, Irvine and San Juan Capistrano, call (714)834-6752 or visit www.oclandfills.com.

ATTACHMENT 5

WATER QUALITY CALCULATIONS

Sunset Ridge Park
Newport Beach, CA

<u>Water Quality Treatment Calculation</u>

Total Area = 20.4 acres (within Limits of Work)

Impervious Areas: Entry Road, Parking Lot, Other (includes walking paths, play areas)

$A_{Parking\ Lot}$ = 0.74 acres

$A_{Entry\ Road}$ = 1.3 acres

A_{Other} (approx.) = 0.90 acres

$A_{Impervious}$ = 2.94 acres

Project Perviousness (%) = 85.6%

Q=CIA

where C = 0.26 (per Table A-1) , I = 0.2 in/hr, and A = 20.4 acres

Q_{treat} = <u>1.06 cfs</u>

HYDROLOGY AND WATER QUALITY APPENDIX I

The Sunset Ridge Park Water Quality Management Plan identifies and establishes Best Management Practices (BMPs) to be used on site to control runoff, and ensure the Project meets established water quality objectives and protects existing beneficial uses of receiving waters. These BMPs are consistent with the requirements set forth in the County of Orange Drainage Area Management Plan, and include measures to address water quality effects of the Project from construction as well as long-term project operation.

TABLE I-1
CONSTRUCTION SITE BMPS

Number	Activity
Erosion-Control BMPs	
EC-1	Scheduling
EC-2	Preservation of Existing Vegetation
EC-3	Hydraulic Mulch
EC-4	Hydroseeding
EC-7	Geotextiles and Mats
EC-8	Wood Mulching
EC-9	Earth Dikes and Drainage Swales
Sediment-Control BMPs	
SE-1	Silt Fence
SE-2	Sediment Basin
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-8	Sand Bag Barrier
SE-10	Storm Drain Inlet Protection
Wind Erosion-Control BMPs	
WE-1	Wind Erosion Control
Tracking-Control BMPs	
TR-1	Stabilized Construction Entrance/Exit
TR-2	Stabilized Construction Roadway
Non-Storm Water Management BMPs	
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-5	Clear Water Diversion
NS-6	Illicit Connection/Discharge
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-12	Concrete Curing
NS-13	Concrete Finishing

TABLE I-1 (Continued)
CONSTRUCTION SITE BMPS

Number	Activity
Waste Management and Materials Pollution Control BMPs	
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-8	Concrete Waste Management
WM-9	Sanitary/Septic Waste Management
WM-10	Liquid Waste Management
Source: Urban Resources 2009c.	

TABLE I-2
BEST MANAGEMENT PRACTICES AND SITE DESIGN CONCEPTS

BMP	Description	Implementation
Structural (for Post-Construction/Project Operation)		
S1	Provide Storm Drain Stenciling and Signage	"No Dumping - Drains to Ocean" phrase to be stenciled on catch basins to alert the public to the destination of pollutants discharged into storm water.
S2	Design Trash Storage Areas to Reduce Pollutant Introduction	All trash container areas shall provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation. Connection of trash area drains to the municipal storm drain is not allowed. Trash container areas shall be paved with an impervious surface.
S3	Use Efficient Irrigation Systems and Landscape Design	Fertilizer/pesticide/herbicide use, irrigation management practices, and landscape management practices shall be maintained consistent with the County Ordinance Amending the Zoning Code Regarding the Conservation of Water in Landscaping for Common Areas of Multifamily and Non-Residential Development. Fertilizer and pesticide usage shall be administered consistent with Orange County's *Management Guidelines for the Use of Fertilizers and Pesticides* (M.G.F.P.). The design and maintenance of the irrigation system would use state-of-the-art technology that minimizes both the amount of water applied and the amount of runoff. The system shall also be designed with the criteria established by the County of Orange and the City of Newport Beach. The combination of technology and design criteria leads to an efficient and ecological system for landscape irrigation. Selections of irrigation methods shall be made based on similar water requirements in order to reduce excess irrigation runoff and to promote surface filtration. Irrigation design or maintenance deficiencies that cause excessive irrigation water runoff would be immediately corrected.
S4	Protect Slopes and Channels	
Non-Structural (for Post-Project Construction)		
N1	Education for Property Owners and Tenants of the Commercial Site (to be provided at the City's discretion) - The City of Newport Beach shall periodically provide environmental awareness education materials to its tenants/park users.	
N2	Activity Restrictions – Rules or guidelines for Sunset Ridge Park shall be established within appropriate documents, if applicable, which prohibit activities that can result in discharges of pollutants. Activity restrictions are the responsibility of the City of Newport Beach.	

TABLE I-2 (Continued)
BEST MANAGEMENT PRACTICES AND SITE DESIGN CONCEPTS

BMP	Description	Implementation
N3	Landscape Management for the Site – City-approved Landscape Construction Plans shall be prepared. All landscape maintenance activities shall conform to the *Orange County Management Guidelines for the Use of Fertilizers and Pesticides* (M.G.F.P.). The key applicable landscape BMPs are to:	• Minimize irrigation runoff by using controllers to provide several short cycles instead of one long cycle for each area. • Immediately correct any irrigation design or maintenance deficiencies that cause excessive runoff of irrigation water. • Have application, storage, handling, and transportation of fertilizer follow the recommendations of the Orange County M.G.F.P. (specifically, §§2.0.4 and 2.0.5). • Prohibit application of chemicals less than three days prior to predicted chance of rain. • Follow all fertilizer application with light irrigation to permit the fertilizer to soak into the landscape area. • Conduct annual testing of turf soil until results stabilize and an accurate determination can be made of fertilization needs in addition to a corresponding reduction in the application of unnecessary fertilizers. Soil testing and pursuant recommendations for fertilizer use shall be conducted by a qualified fertilizer specialist as recommended in the Orange County M.G.F.P. (§2.3.1). • Limit weed control to either mechanical methods or USEPA-labeled herbicides. • Use pesticides only after recommendation from a State-licensed pest control advisor per the Orange County M.G.F.P. (§3.3.1). • Ensure pesticides are only applied by, or under the direct supervision of, a State-licensed or certified pesticide applicator or by workers with equivalent training per the Orange County M.G.F.P. (§3.4.1). • The storage, handling, and transportation of pesticides shall follow the recommendations of the Orange County M.G.F.P. (§3.0).
N4	BMP Maintenance – The City of Newport Beach shall be responsible for implementing each of the non-structural BMPs. The contact person for the City of Newport Beach is Mr. Michael Sinacori, Assistant City Engineer, at (949) 644-3342.	
N6	Local Water Quality Permit Compliance – The Water Quality Management Plan shall comply with the City of Newport Beach Council Policies No. L-18 and No. L-22.	
N11	Common Area Litter Control – The City of Newport Beach shall implement trash management and litter control procedures on the site that are aimed at reducing pollution of drainage water. The City may contract with its landscape maintenance firms to provide this service during regularly scheduled maintenance. It would consist of litter patrol and emptying trash receptacles.	

TABLE I-2 (Continued)
BEST MANAGEMENT PRACTICES AND SITE DESIGN CONCEPTS

BMP	Description	Implementation
N12	Employee Training – Employee training shall be provided to Park maintenance personnel, and is the responsibility of the City of Newport Beach.	
N14	Private Catch Basin Inspection – The City of Newport Beach shall inspect and, if necessary, clean private catch basins within the Project site prior to the storm season and no later than October 1 of each year. Effective post-construction maintenance of storm collection and conveyance facilities would ensure not only their intended use, but would also prevent excessive pollutants from entering the drainage system. Occasionally, catch basins and other drainage facilities become clogged by sediment and debris accumulation. In addition, it is not uncommon for illicit dumping of waste material—particularly used motor oil—to occur at catch basins and drainage facilities. Periodic cleaning of catch basins and storm drains would provide the following benefits:	• Removal of pollutant loads from storm drain system • Reduction of high pollutant concentration during the “first flush” event, • Prevention of clogging of the downstream storm water conveyance system.
N15	Street Sweeping of Private Streets and Parking Lots	The City of Newport Beach shall require that the streets and parking areas within the site be swept prior to the storm season, no later than October 1 of each year.
Site Design – Concept 1		
SD-1.1	Minimize impervious footprint	The impervious footprint shall be kept at a minimum, where possible. Ramps and walks will be designed to provide a route compliant with Americans with Disabilities Act (ADA) accessibility requirements with consideration for minimizing the impervious footprint and maximizing pervious landscape areas.
SD-1.2	Conserve natural areas	A natural habitat area located between the park and the entry road shall be preserved.
SD-1.3	Use of permeable paving or other surfaces	Permeable pavers or other permeable material may be used for the park parking lot.
SD-1.4	Design to minimum widths necessary	The walkways and parking lot aisles shall be designed to the minimum widths necessary.
SD-1.5	Maximize canopy interception and water conservation	Canopy interception and water conservation shall be addressed by preserving existing trees and shrubs deemed necessary by the City of Newport Beach.
SD-1.6	Minimize impervious surfaces in landscaping	The landscape design shall minimize the use of impervious surfaces. Pervious materials (such as pervious pavers, turf, permeable concrete, etc.) should be considered in the design, if applicable and feasible.
SD-1.7	Use natural drainage systems	Natural drainage systems such as vegetated swales and vegetated dry creeks shall be incorporated into the design.

TABLE I-2 (Continued)
BEST MANAGEMENT PRACTICES AND SITE DESIGN CONCEPTS

BMP	Description	Implementation
Site Design – Concept 2		
SD-2.1	Adjacent Landscaping	All walkways shall drain into adjacent landscaping. The parking lot shall drain into the vegetated dry creek for cleansing.
SD-2.2	Vegetated Drainage Swales	Vegetated drainage swales shall be considered a treatment-control BMP, for the Project.
SD-2.3	Site Drainage System	Direct runoff from park walkways and landscaping shall be directed to a vegetated swale or the proposed area drain system. All runoff shall be directed or routed via drainlines to the appropriate treatment-control system prior to entering the existing Reinforced Concrete Box storm drain system in West Coast Highway. The entry road flows shall drain into an adjacent vegetated swale for cleansing. Entry road peak flows shall be collected by a catch basin. Parking lot flows would travel through a proposed vegetated dry creek for cleansing and would be picked up by an area drain system.
SD-2.4	Driveway Design	The entry road shall be designed to route “first flush” flows into a vegetated swale for cleansing.
SD-2.5	Parking Area Design	The proposed park parking lot may use permeable pavers. Drainage design for the parking lot would drain flows into the vegetated dry creek for cleansing.
Treatment-Control		
Option 1	• A vegetated swale shall be used to treat the soccer fields, the baseball field, memorial garden, and adjacent proposed landscaping. • A vegetated swale/detention basin shall be used to treat runoff from the entry road and from adjacent proposed landscaping. • A vegetated dry creek shall be used to treat parking lot runoff. • A storm filter vault shall be used to treat the remaining required “first flush” flows not treated by other systems. The vault shall be used to treat the “equivalent” required “first flush” from Superior Avenue and development north of the Project site.	
Option 2	• A vegetated swale/detention basin shall be used to treat the entry road and adjacent runoff from proposed landscaping. • A vegetated dry creek shall be used to treat the parking lot. • A storm filter vault shall be used to treat the remaining required “first flush” flows not treated by other systems. The vault shall be used to treat the “equivalent” required “first flush” from development north of the Project site.	
Other Available Measures	• Rain Gardens • Cisterns • Pervious Pavers • Infiltration Systems • Vegetated Grass Strips	

Inspection/Maintenance Responsibilities for BMPs

Inspection and maintenance of BMPs shall be implemented by the City of Newport Beach prior to completion of the Project. These responsibilities are presented in Table 4.10-7 for structural and non-structural BMPs. Upon final design of treatment-control BMPs, a similar matrix shall be developed that specifies maintenance responsibilities for treatment-control measures.

The City of Newport Beach shall retain all maintenance records for a period of at least five years from the date generated. Those records shall be available for review by government agencies. The methods used for inspection and maintenance shall conform to the guidelines outlined in the Orange County Drainage Area Management Plan.

TABLE I-3
BMP INSPECTION AND MAINTENANCE RESPONSIBILITY MATRIX

BMP Reference No.	BMP	Responsibility	Frequency
S1	Provide Storm Drain System Stenciling and Signage	Implemented and maintained by the City of Newport Beach.	Initially done by contractor during construction of the catch basins and then repainted every 5 years. Inspect annually and repaint as necessary.
S3	Use Efficient Irrigation Systems and Landscape Design	Implemented and maintained by the City of Newport Beach.	Monitor landscape irrigation areas weekly in conjunction with maintenance activities.
S4	Protect Slopes and Channels	Implemented and maintained by the City of Newport Beach.	Monitor and/or clean once a week, in conjunction with maintenance activities.
N1, N2	Education and Activity Restrictions	The City of Newport Beach will provide educational materials for park users regarding downstream water quality, as required.	Continuous.
N3	Landscape Management of Common Areas	Implemented by the City of Newport Beach, which will provide ongoing maintenance of common areas consistent with County-approved water quality guidelines.	Monthly review of landscape maintenance and irrigation procedures to ensure effectiveness.
N11	Common Area Litter Control	Implemented and maintained by the City of Newport Beach.	Weekly sweeping and trash pickup within landscape areas and outside walkways. Daily inspection of trash receptacles to ensure that lids are closed and any excess trash on the ground is picked up.
N14	Catch Basin Inspection	Implemented and maintained by the City of Newport Beach.	Yearly to clean debris and silt in bottom of catch basins. Intensified around October 1 of each year prior to "first flush" storm.
N15	Street Sweeping	Implemented and maintained by the City of Newport Beach.	Weekly vacuum sweeping. Intensified around October 1st of each year prior to "first flush" storm.

TABLE I-3 (Continued)
BMP INSPECTION AND MAINTENANCE RESPONSIBILITY MATRIX

BMP Reference No.	BMP	Responsibility	Frequency
TC-Opt 1/2	Proprietary Control Measure(s)	Implemented and maintained by the City of Newport Beach and/or Manufacturer.	Minimum 2 scheduled visits per year, scheduled seasonally in the spring and fall.
TC-Opt 1/2	Vegetated and Riparian Bioswale; Bioretention Dry Creek	Implemented and maintained by the City of Newport Beach.	Monitor and/or clean once a week, in conjunction with maintenance activities, as required.