HYDROLOGY ANALYSIS

FOR

THE COVE AT EL NIGUEL

TRACT NO. 17721

Site Development Permit No. SP16-04
APN: 656-231-02
Corner of Crown Valley Pkwy and Playa Blanca Dr.
City of Laguna Niguel
Orange County, California

May 14, 2021

Updated: August 16, 2021

Prepared for:

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PRELIMINARY HYDROLOGY ANALYSIS

FOR

THE COVE AT EL NIGUEL

TTM 17721

City of Laguna Niguel

County of Orange

MAY 14, 2021
Updated: August 16, 2021

PREPARED UNDER THE SUPERVISION OF:

08/16/2021

Jianhua "Gary" Guan, R.C.E. 64519, Exp. 06/30/23 Date:

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SECTION 1

INTRODUCTION & DISCUSSION

A. PROJECT LOCATION

The proposed residential developments for the Cove at El Niguel –Tentative Tract Map (TTM) No. 17721, is located immediately west of the Crown Valley Parkway, Playa Blanca intersection in the City of Laguna Niguel (Refer to Vicinity Map for general locations, Page 2).

The project site is bound by existing residential to the north, west, and south. Crown Valley Parkway forms the easterly boundary.

B. STUDY PURPOSE

The purpose of this preliminary hydrology study is to determine the flow rates produced by the site in its existing and proposed conditions for comparisons. It will also serve as the basis for analyzing and designing the proposed development's required storm drain system. As part of the report, the 10- and 100-year storm events for both existing and proposed conditions were analyzed. In addition, water quality BMPs are provided to ensure all flows will be treated prior to release into the existing storm drain systems. The upsized pipes are proposed to act as the underground detention facilities to meet the hydromodification mitigation requirements.

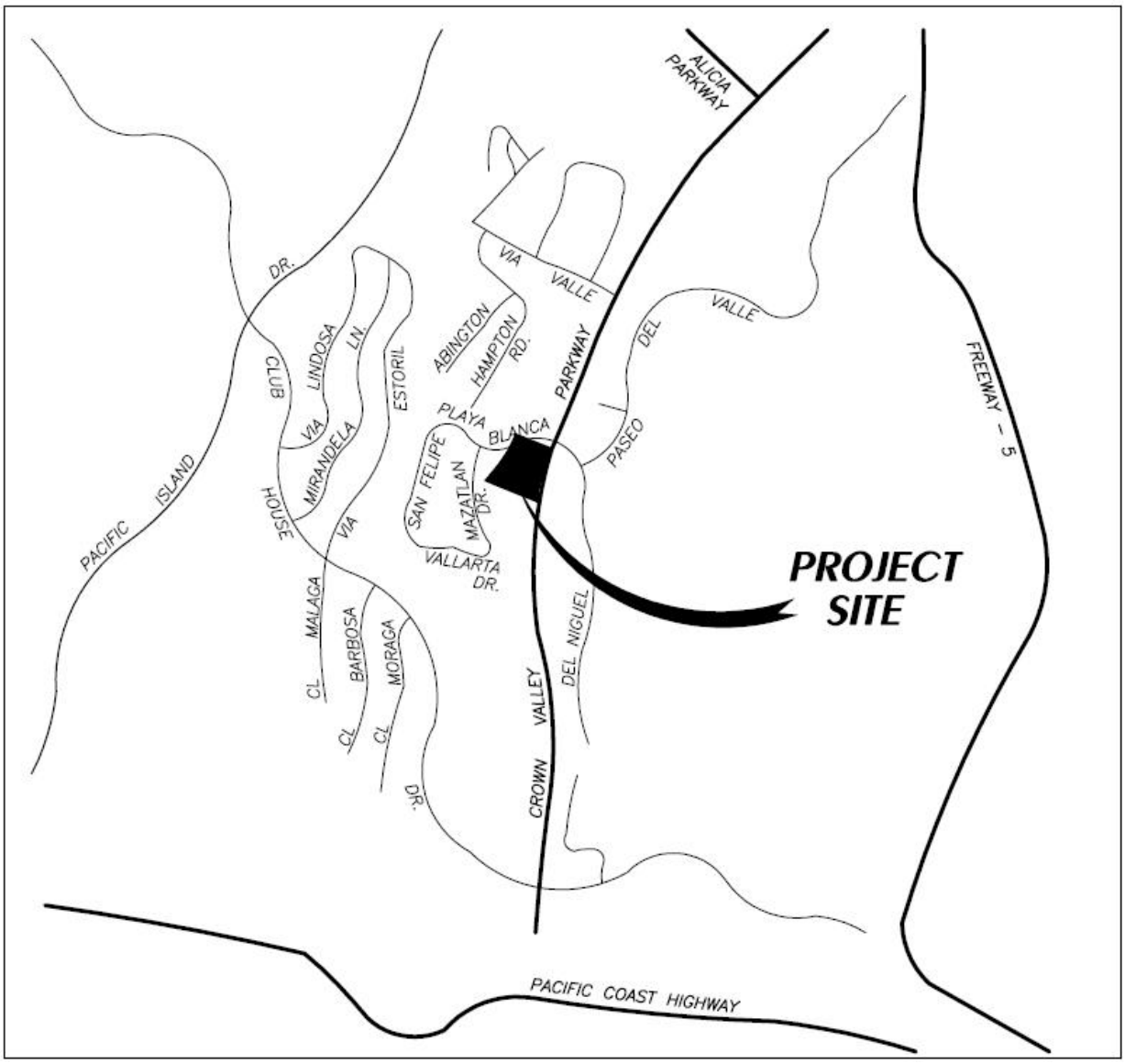
C. DISCUSSION

History:

The project site was once a 41 unit residential community circa 1979 as can be seen on attached reference plan title sheet for Tract 9650. There is a 42"-48" storm drain pipe traversing west to east on the southerly boundary of the project site that was constructed per Tract 9650 Improvements circa 1979; refer to Section 4 Reference D for details.

The storm drain was later extended to serve communities up through Clubhouse Drive and further circa 1986 per the attached reference plans for Tract 12431 improvements.

The project site was subjected to detrimental slope creep and consequentially all homes were removed along with most of the site's infrastructure. The slope was stabilized circa 1999 per a Landslide Remediation Plan attached in Reference Section 4 for reference. Remaining infrastructure includes storm drain pipes from the previous community, terrace drains per the remediation plan, a paved access road that winds up to the top of the site, and a relatively flat 1.2 acre area at the bottom of the slope where the proposed residential community is to be located.



VICINITY MAP

NOT TO SCALE

Existing Condition:

The project site is currently vacant and vegetated with replanted ground cover and tall shrubs from slope repairs and paved access roads.

Currently, there are existing storm drains conveying runoff west to east on the southern border of the site. The storm drain sizes vary from 36" (at Club House Drive) to 48" (at Crown Valley Parkway). The 36" storm drain along Club House Drive conveys the upstream residential runoffs. The hydrology studies for the Club House Drive storm drain cannot be obtained. The as-built storm drain plans per Tract 12431 show a 10-year design storm of 148.4 cfs for the 36" storm drain (at Club House Drive) and a 10-

year design storm of 202.0 cfs for the 48" storm drain (at Crown Valley Parkway). The 48" storm drain continues easterly and discharges into to existing concrete lined channel at El Niguel Country Club.

The hydrology study in this report was extended to include the off-site tributary areas to the existing 36" storm drain (at Club House Drive) by applying the current Orange County Hydrology Manual and updated storm drain systems and topo information. The hydrology results and comparisons can be found from Hydrology Results discussion in this Section.

There is an existing 30" to 36" storm drains conveying runoffs north to south across the leveled project area where the proposed residential community is to be located. The existing 30" storm drain conveys the runoffs from a portion of the upper-north end of the site with terrace drains and headwall and the existing 30" storm drain main was constructed circa 1979 per Tract 9650 Improvement Plans (see attached in Reference Section 4).

The existing 36" storm drain joins the existing 48" storm drain and continues to the storm drains crossing Crown Valley Parkway.

Currently, the above discussed 36", 42" and 48" storm drain systems in the vicinity of the project site are owned and maintained by City of Laguna Niguel.

The majority of the drainage areas between Club House Drive and Crown Valley Parkway are dominated by brush laden slopes with terrace drains constructed per a circa 1999 landslide remediation plan.

Runoffs from the flatter portion of the site sheet flows easterly to a V-ditch paralleling Crown Valley Parkway. The V-ditch ends at a 5' diameter riser structure and then to the southerly 48" storm drain via a 24" storm drain lateral.

Runoffs from the slopes adjacent to the paved driveway entrance (at Playa Blanca Drive) and the driveway sheet flows down the paved driveway, over the sidewalk and into the Crown Valley Parkway street gutter. Runoffs continue 370' southerly on the west side of Crown Valley Parkway in the street gutter to be picked up in a street-side catch basin.

The existing storm drain systems and drainage areas can be found from the existing condition hydrology map.

Proposed Condition

The proposed project consists of construction of an approximately 1.2-acre area of developable pad of the 4.2 acres site, set within hillside terrain constructed with 2:1 (Horizontal to Vertical) slopes and the Mechanically Stabilized Earth (MSE) retaining

walls. Access to the proposed development would be provided from the existing entrance road - Playa Blanca Drive, off Crown Valley Parkway at the northeast corner of the site. A 22 unit residential condominium development is currently proposed for the site.

Proposed grading and drainage infrastructure has been designed to maximize the flat buildable area while reducing the amount of runoff flowing directly into Crown Valley Parkway.

The two existing main storm drain pipes - the 36" storm drain main conveying runoff north to south and the 48" storm drain main conveying runoff west to east will be re-routed within the site's drive aisles. The proposed 48" storm drain will continue along Drive "B" and follows the sidewalk of the Crown Valley Parkway and joins the existing 48" storm drain to minimize the traffic impacts for Crown Valley Parkway during construction.

There are inlet structures provided to collect the off-site runoffs and along the proposed MSE walls. The proposed project site runoffs (roads, buildings, and level landscaped areas on the project site) are designed to join the proposed re-routed storm drain systems.

The area tributary to Crown Valley Parkway is reduced from 1.70 acres to 1.24 acres. The existing catch basin along Crown Valley Parkway would need to be relocated due to the conflicts with proposed storm drains along Crown Valley Parkway.

There are two Modular Wetland Systems (MWS) proposed for water quality treatments. There is also a 200-ft long 48-inch diameter upsized pipe located along A drive. The upsized pipe acts as the detention facility to meet the Hydromodification LID requirements. Detailed MWS sizing and hydromodification calculations can be found the WQMP reports under a separate cover.

D. HYDROLOGY METHODOLOGY

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

Hydrologic calculations to determine the 10- and 100-year discharges at critical locations throughout the project site were performed using the Orange County Rational Method. A technical description of the rational method is provided in the Orange County Hydrology Manual dated October, 1986. The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for small watersheds for storms of a specified recurrence interval. The rational method equation is based on the assumption that the peak flow rate is directly proportional to the drainage area, rainfall intensity and a loss coefficient which describes the effects of land

use and soil type. The design discharges were computed by generating a hydrologic "link-node" model which divides the area into subareas, each tributary to a concentration point or hydrologic "node" point determined by the proposed terrain or street layout.

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

- The Rational Method hydrology includes the effects of infiltration caused by soil surface characteristics. The soil map from Orange County Hydrology Manual indicates that the study area consists mainly of soil type D. Hydrologic soils ratings are based on a scale of A through D, where A is the most pervious, providing the least runoff.
- The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surface. The runoff coefficients used for this study were based on the proposed residential and open space land uses.
- Standard intensity-duration curve data was taken from the Orange County Hydrology Manual, dated October, 1986.

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

Since the hydrology studies for the existing 30" storm drain along Club House Drive cannot be obtained, the user input hydrologic information was applied to the off-site areas. The off-site area is estimated to be 87 tributary acres and a land use with an average 3-4 dwellings/acres (40 % impervious). An estimated 15-minute Time of Concentration (TC) was applied in the hydrology study.

The hydrology study in this report was extended to include the off-site tributary areas to the existing 36" storm drain (at Club House Drive) by applying the current Orange County Hydrology Manual and updated storm drain systems and topo information.

E. HYDROLOGY RESULTS

There is only one drainage area within the studied area for this hydrology analysis. The hydrology study has been extended to include the off-site areas. The overall drainage areas drain to the existing storm drain systems at Crown Valley Parkway.

The existing condition hydrology analysis for 10-year and 100-year storms can be found in Section 2. And the proposed condition hydrology analysis can be found in Section 3. Table 1 summarizes the hydrology analysis results for the overall hydrology study.

Existing Condition with Updated Off-Site Hydrology Study

The hydrology study in this report was extended to include the off-site tributary areas to the existing 36" storm drain (at Club House Drive) by applying the current Orange County Hydrology Manual and updated storm drain systems and topo information. The storm drain systems are from Orange County Basemap of Drainage Facilities from Orange County Flood Control and the basemaps can be found from Reference Section 4.

The as-built storm drain plans per Tract 12431 show a 10-year design storm of 148.4 cfs for the 36" storm drain (at Club House Drive) and a 10-year design storm of 202.0 cfs for the 48" storm drain (at Crown Valley Parkway). The updated hydrology study indicated the 10-year storm flow of 168.5 cfs with an increase of 20.1 cfs for the 36" storm drain (at Club House Drive) and a 10-year storm flow rate of 191.1 cfs with a decrease of 10.9 cfs for the 48" storm drain (at Crown Valley Parkway).

Existing Condition and Proposed Condition Comparisons

As indicated in the table 1, the total 10-year peak flow is approximately 190.9 cfs and 100-year flow rate is approximately 302.6 cfs with a tributary area of 109.7 acres for the existing condition. The total 10-year peak flow is 190.3 cfs and 100-year flow rate is approximately 302.0 cfs with the same tributary area for the proposed condition.

As shown from Table 1, the proposed condition flow rates are very close to the existing condition with minor decreases. The developed area is only 1.4 acres where portions of the project are covered with the paved surface. The re-routed storm drain systems increases the time of travel, thus the minor peak flow rates decrease. Please note that the as-built plans indicated a 10-year design storm of 202.0 cfs for the 48" storm drain at Crown Valley Parkway and the proposed 10-year storm flow rate is about 190.2 cfs which is less than the existing storm drain design flow rate.

Table 1 Hydrology Analysis Summary
Tract 17721 - The Cove at El Niguel
City of Laguna Niguel

Existing Condition				Proposed Condition				Difference (Proposed-Existing)		
Area	Area (acre)	10-yr (cfs)	100-yr (cfs)	Area	Area (acre)	10-yr (cfs)	100-yr (cfs)	Area (acre)	10-yr (cfs)	100-yr (cfs)
Overall Project	109.7	190.9	302.6	Overall Project	109.7	190.3	302.0	0.00	-0.60	-0.60
Overall	109.7	190.9	302.6	Overall	109.7	190.3	302.0	0.00	-0.60	-0.60

F. WATER QUALITY AND HYDROMODIFICATION REPORT

The water quality BMPs and Hydromodification devices are provided for the project to meet the WQMP and LID requirements. The Modular Wetland Systems (MWS) are proposed for water quality treatments and the upsized pipes (about 200-ft of 48" pipe) are proposed to act as the underground detention facilities to meet the hydromodification mitigation requirements. Large 10-year (design storm) and 100-year storm runoff is the emphasis of this report; smaller 2 to 10-year storm and water quality analysis was performed per a separate WQMP Report.

G. CONCLUSIONS

Both the existing and proposed condition hydrology analysis were performed in this report, the hydrology study has been extended to include the off-site areas. Portions of the existing storm drain systems were proposed to be re-routed to be within the site's drive aisles and the sidewalks of the Crown Valley Parkway.

The hydrology study indicated that the proposed condition flow rates are less than the existing condition as shown in Table 1 by a reduction of 0.60 cfs. Flow rates are below the design flow rates at the downstream tie-in location.

Overall, it is concluded that there will be no adverse impacts to the existing drainage systems caused by the proposed residential project.

SECTION 2

EXISTING CONDITION
HYDROLOGY CALCULATIONS AND MAP

A. 10-YEAR STORM

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************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                        Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for El Niguel - TTM 1721                              *
* Existing Condition                                                    *
* 10-year Storm                                                         *
 ************************************************************************

  FILE NAME: 17721E.DAT
  TIME/DATE OF STUDY: 09:57 08/18/2021
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    770.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.585
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  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        1.00      0.20     1.000    83   12.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.97

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  770.00  DOWNSTREAM ELEVATION(FEET) =  752.00
  STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.73   Tc(MIN.) =   13.32
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.316
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         D        3.60      0.20     0.700    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    7.05
  EFFECTIVE AREA(ACRES) =      4.60    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       8.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.16
  FLOW VELOCITY(FEET/SEC.) =  5.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.00  DOWNSTREAM(FEET) =   730.00
 FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.07
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.95
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   13.53
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     735.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.53
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.295
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       14.70      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   14.70      SUBAREA RUNOFF(CFS) =   28.77
 EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      37.64

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   730.00  DOWNSTREAM(FEET) =   680.00
 FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.64
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   14.11
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1415.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.11
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.241
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       21.30      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   21.30      SUBAREA RUNOFF(CFS) =   40.65
 EFFECTIVE AREA(ACRES) =     40.60   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =       40.6       PEAK FLOW RATE(CFS) =      77.35

****************************************************************************
 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) =   680.00  DOWNSTREAM(FEET) =   612.00
 FLOW LENGTH(FEET) =   840.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.45
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      77.35
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   14.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    2255.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.68
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.190
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         D       20.40      0.20     0.700    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =   20.40      SUBAREA RUNOFF(CFS) =   37.64
 EFFECTIVE AREA(ACRES) =     61.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =       61.0       PEAK FLOW RATE(CFS) =     113.15

****************************************************************************
 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) =   612.00  DOWNSTREAM(FEET) =   533.00
```

```
 FLOW LENGTH(FEET) =  1065.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.30
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     113.15
 PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    3320.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.35
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.134
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         D       15.50      0.20     0.700    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =   15.50      SUBAREA RUNOFF(CFS) =   27.82
 EFFECTIVE AREA(ACRES) =     76.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =       76.5       PEAK FLOW RATE(CFS) =     137.91

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   533.00  DOWNSTREAM(FEET) =   513.00
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.68
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     137.91
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   15.53
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    3595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.53
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.121
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       17.50      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   17.50      SUBAREA RUNOFF(CFS) =   31.51
 EFFECTIVE AREA(ACRES) =     94.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =       94.0       PEAK FLOW RATE(CFS) =     168.49

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   513.00  DOWNSTREAM(FEET) =   498.00
 FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.84
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     168.49
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   15.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    3820.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     14.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.00  DOWNSTREAM(FEET) =   409.50
 FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  49.37
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     168.49
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   15.78
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.78
 RAINFALL INTENSITY(INCH/HR) =   2.10
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.65
 EFFECTIVE STREAM AREA(ACRES) =      94.00
 TOTAL STREAM AREA(ACRES) =      94.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     168.49

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =    516.00  DOWNSTREAM(FEET) =    458.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.75      0.20     1.000    81   10.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      1.62

********************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    458.50  DOWNSTREAM(FEET) =    434.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   405.00   CHANNEL SLOPE =  0.0605
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.500
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.96      0.20     1.000    81
  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) =       3.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.53
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   0.79
  Tc(MIN.) =   11.65
  SUBAREA AREA(ACRES) =     1.96       SUBAREA RUNOFF(CFS) =    4.06
  EFFECTIVE AREA(ACRES) =      2.71     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       5.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.46
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     13.00 =     635.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    409.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =  0.3500
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.493
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.86      0.20     1.000    81
  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) =       7.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  19.64
  AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   0.06
  Tc(MIN.) =   11.71
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    3.84
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       9.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =  20.82
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     14.00 =     705.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.71
  RAINFALL INTENSITY(INCH/HR) =   2.49
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.57
  TOTAL STREAM AREA(ACRES) =       4.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      168.49   15.78    2.101  0.20( 0.13) 0.65      94.0       1.00
      2        9.43   11.71    2.493  0.20( 0.20) 1.00       4.6      11.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      159.30   11.71    2.493  0.20( 0.13) 0.67      74.3      11.00
      2      176.31   15.78    2.101  0.20( 0.13) 0.66      98.6       1.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     176.31    Tc(MIN.) =    15.78
 EFFECTIVE AREA(ACRES) =      98.57   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =       98.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   409.50  DOWNSTREAM(FEET) =   391.00
 FLOW LENGTH(FEET) =   305.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.40
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     176.31
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   15.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    4425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.97
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.087
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        1.46      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.46      SUBAREA RUNOFF(CFS) =    2.48
 EFFECTIVE AREA(ACRES) =    100.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      100.0       PEAK FLOW RATE(CFS) =     176.31
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   390.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.06
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     176.31
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   15.99
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    4450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.99
 *  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
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.93      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.58
 EFFECTIVE AREA(ACRES) =    100.96   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.0       PEAK FLOW RATE(CFS) =     177.31

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =   384.00
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  25.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.48
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     177.31
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   16.04
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    4540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.04
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.082
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.21      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.21      SUBAREA RUNOFF(CFS) =    0.36
 EFFECTIVE AREA(ACRES) =    101.17   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.2       PEAK FLOW RATE(CFS) =     177.31
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
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```
 FLOW PROCESS FROM NODE     17.00 TO NODE     25.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   384.00  DOWNSTREAM(FEET) =   381.00
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.21
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     177.31
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   16.11
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    4630.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.11
 RAINFALL INTENSITY(INCH/HR) =   2.08
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.67
 EFFECTIVE STREAM AREA(ACRES) =     101.17
 TOTAL STREAM AREA(ACRES) =     101.17
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     177.31

****************************************************************************
 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) =   265.00
 ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    460.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.765
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.486
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.75      0.20     1.000    81   11.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.54
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      1.54

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    410.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.1724
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.435
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.71      0.20     1.000    81
 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) =       2.26
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.19
 AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.43
 Tc(MIN.) =   12.20
 SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =    1.43
 EFFECTIVE AREA(ACRES) =      1.46     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       2.94

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =  12.12
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     555.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    392.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1125
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.94
 FLOW VELOCITY(FEET/SEC) =   5.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =   12.65
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     715.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.65
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.90      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    3.74
```

```
  EFFECTIVE AREA(ACRES) =      3.36   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) =       6.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   392.00  DOWNSTREAM(FEET) =   382.00
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.99
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.61
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.05
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =     955.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.343
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.02      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.02      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      4.38   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =       8.45

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   381.00
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.45
  PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   14.08
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    1230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.08
  RAINFALL INTENSITY(INCH/HR) =   2.24
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.38
  TOTAL STREAM AREA(ACRES) =       4.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.45

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      161.00   12.05    2.453  0.20( 0.14) 0.68      76.9      11.00
      1      177.31   16.11    2.076  0.20( 0.13) 0.67     101.2       1.00
      2        8.45   14.08    2.243  0.20( 0.20) 1.00       4.4      20.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      168.97   12.05    2.453  0.20( 0.14) 0.69      80.7      11.00
      2      177.63   14.08    2.243  0.20( 0.14) 0.69      93.5      20.00
      3      185.07   16.11    2.076  0.20( 0.14) 0.68     105.5       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     185.07    Tc(MIN.) =    16.11
  EFFECTIVE AREA(ACRES) =     105.55   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      105.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    4630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   381.00  DOWNSTREAM(FEET) =   377.00
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.99
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     185.07
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   16.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.00 =    4655.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.076
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.43      0.20     0.100    75
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        0.89      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.707
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =    106.87   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.69
  TOTAL AREA(ACRES) =      106.9       PEAK FLOW RATE(CFS) =     186.46

********************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   377.00  DOWNSTREAM(FEET) =   361.00
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  18.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  40.83
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     186.46
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   16.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    4750.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.073
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        1.17      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =    108.04   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.69
  TOTAL AREA(ACRES) =      108.0       PEAK FLOW RATE(CFS) =     188.15

********************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   361.00  DOWNSTREAM(FEET) =   360.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.77
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     188.15
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   16.19
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    4790.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.19
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.93      0.20     0.100    75
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        0.77      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.508
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    3.01
  EFFECTIVE AREA(ACRES) =    109.74   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.69
  TOTAL AREA(ACRES) =      109.7       PEAK FLOW RATE(CFS) =     190.92
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      109.7  TC(MIN.) =     16.19
  EFFECTIVE AREA(ACRES) =    109.74  AREA-AVERAGED Fm(INCH/HR)=  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.686
  PEAK FLOW RATE(CFS)   =     190.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      175.97   12.13    2.443  0.20( 0.14) 0.69      84.9      11.00
      2      184.28   14.17    2.235  0.20( 0.14) 0.69      97.7      20.00
      3      190.92   16.19    2.070  0.20( 0.14) 0.69     109.7       1.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

B. 100-YEAR STORM

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for El Niguel - TTM 1721                              *
* Existing Condition                                                    *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: 17721E.DAT
  TIME/DATE OF STUDY: 09:55 08/18/2021
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    770.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.585
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.646
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20     1.000    96   12.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.10
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.10

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  770.00  DOWNSTREAM ELEVATION(FEET) =  752.00
  STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.72
  STREET FLOW TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   13.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.538
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         D        3.60      0.20     0.700    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   11.01
  EFFECTIVE AREA(ACRES) =      4.60    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      14.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.20
  FLOW VELOCITY(FEET/SEC.) =  6.24   DEPTH*VELOCITY(FT*FT/SEC.) =   2.15
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.00  DOWNSTREAM(FEET) =   730.00
 FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.13
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.01
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.45
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     735.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.45
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.509
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       14.70      0.20     0.600    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   14.70      SUBAREA RUNOFF(CFS) =   44.84
 EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      58.74

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   730.00  DOWNSTREAM(FEET) =   680.00
 FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.69
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      58.74
 PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   13.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1415.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.434
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       21.30      0.20     0.600    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   21.30      SUBAREA RUNOFF(CFS) =   63.52
 EFFECTIVE AREA(ACRES) =     40.60   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =       40.6       PEAK FLOW RATE(CFS) =     120.94

****************************************************************************
 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) =   680.00  DOWNSTREAM(FEET) =   612.00
 FLOW LENGTH(FEET) =   840.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.58
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     120.94
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   14.48
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    2255.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.48
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.364
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         D       20.40      0.20     0.700    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =   20.40      SUBAREA RUNOFF(CFS) =   59.19
 EFFECTIVE AREA(ACRES) =     61.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =       61.0       PEAK FLOW RATE(CFS) =     177.59

****************************************************************************
 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) =   612.00  DOWNSTREAM(FEET) =   533.00
```

```
  FLOW LENGTH(FEET) =  1065.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.42
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     177.59
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   15.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    3320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         D       15.50      0.20     0.700    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =   15.50      SUBAREA RUNOFF(CFS) =   43.89
  EFFECTIVE AREA(ACRES) =     76.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =       76.5       PEAK FLOW RATE(CFS) =     217.22

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   533.00  DOWNSTREAM(FEET) =   513.00
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.68
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     217.22
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   15.23
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    3595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.268
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D       17.50      0.20     0.600    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   17.50      SUBAREA RUNOFF(CFS) =   49.58
  EFFECTIVE AREA(ACRES) =     94.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =       94.0       PEAK FLOW RATE(CFS) =     265.52

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   513.00  DOWNSTREAM(FEET) =   498.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  37.56
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     265.52
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   15.33
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    3820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     14.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   498.00  DOWNSTREAM(FEET) =   409.50
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  54.85
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     265.52
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   15.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.43
  RAINFALL INTENSITY(INCH/HR) =   3.24
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =      94.00
  TOTAL STREAM AREA(ACRES) =      94.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     265.52

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

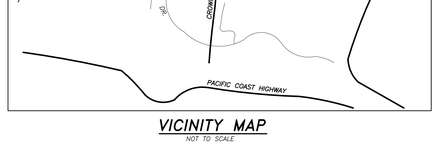
```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =    516.00  DOWNSTREAM(FEET) =    458.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.862
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.967
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BROWN"               D        0.75      0.20     1.000    95   10.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.54
  TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      2.54

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    458.50  DOWNSTREAM(FEET) =    434.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   405.00   CHANNEL SLOPE =  0.0605
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BROWN"               D        1.96      0.20     1.000    95
  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) =       5.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.61
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.70
  Tc(MIN.) =   11.56
  SUBAREA AREA(ACRES) =     1.96       SUBAREA RUNOFF(CFS) =    6.40
  EFFECTIVE AREA(ACRES) =      2.71     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       8.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =  10.61
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     13.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    409.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =  0.3500
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.817
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BROWN"               D        1.86      0.20     1.000    95
  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) =      11.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  22.30
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =   11.62
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    6.05
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =      14.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =  23.57
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     14.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.62
  RAINFALL INTENSITY(INCH/HR) =   3.82
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.57
  TOTAL STREAM AREA(ACRES) =       4.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.88

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      265.52   15.43    3.245  0.20( 0.13) 0.65      94.0       1.00
      2       14.88   11.62    3.817  0.20( 0.20) 1.00       4.6      11.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      251.58   11.62    3.817  0.20( 0.13) 0.67      75.4      11.00
      2      278.04   15.43    3.245  0.20( 0.13) 0.66      98.6       1.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     278.04    Tc(MIN.) =    15.43
 EFFECTIVE AREA(ACRES) =      98.57   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =       98.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   409.50  DOWNSTREAM(FEET) =   391.00
 FLOW LENGTH(FEET) =   305.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.90
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     278.04
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   15.60
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    4425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.224
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        1.46      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.46      SUBAREA RUNOFF(CFS) =    3.97
 EFFECTIVE AREA(ACRES) =    100.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      100.0       PEAK FLOW RATE(CFS) =     278.18

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   390.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.91
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     278.18
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   15.62
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    4450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.222
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.93      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.53
 EFFECTIVE AREA(ACRES) =    100.96   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.0       PEAK FLOW RATE(CFS) =     280.56

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =   384.00
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.16
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     280.56
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   15.67
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    4540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.21      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.21      SUBAREA RUNOFF(CFS) =    0.57
 EFFECTIVE AREA(ACRES) =    101.17   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.2       PEAK FLOW RATE(CFS) =     280.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     25.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   384.00  DOWNSTREAM(FEET) =   381.00
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.16
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     280.58
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   15.72
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    4630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.72
  RAINFALL INTENSITY(INCH/HR) =   3.21
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.67
  EFFECTIVE STREAM AREA(ACRES) =     101.17
  TOTAL STREAM AREA(ACRES) =     101.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     280.58

****************************************************************************
  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) =   265.00
  ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    460.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.765
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.789
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        0.75      0.20     1.000    95   11.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.1724
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.720
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        0.71      0.20     1.000    95
  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) =       3.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.50
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =   12.15
  SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =     2.25
  EFFECTIVE AREA(ACRES) =      1.46     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       4.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =  13.44
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    392.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1125
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.62
  FLOW VELOCITY(FEET/SEC) =   6.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   12.56
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"                D        1.90      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    5.90
 EFFECTIVE AREA(ACRES) =      3.36   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) =      10.43

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   392.00  DOWNSTREAM(FEET) =   382.00
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.42
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.43
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.91
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =     955.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.593
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        1.02      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.02      SUBAREA RUNOFF(CFS) =    3.11
 EFFECTIVE AREA(ACRES) =      4.38   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =      13.38

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   381.00
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.02
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.38
 PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   13.82
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    1230.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   13.82
 RAINFALL INTENSITY(INCH/HR) =   3.46
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       4.38
 TOTAL STREAM AREA(ACRES) =       4.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.38

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      254.87   11.94    3.757  0.20( 0.14) 0.68      78.0      11.00
     1      280.58   15.72    3.210  0.20( 0.13) 0.67     101.2       1.00
     2       13.38   13.82    3.455  0.20( 0.20) 1.00       4.4      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      267.50   11.94    3.757  0.20( 0.14) 0.69      81.7      11.00
     2      281.05   13.82    3.455  0.20( 0.14) 0.69      93.9      20.00
     3      292.95   15.72    3.210  0.20( 0.14) 0.68     105.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     292.95    Tc(MIN.) =    15.72
 EFFECTIVE AREA(ACRES) =     105.55   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      105.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    4630.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   381.00  DOWNSTREAM(FEET) =   377.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  24.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  45.07
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     292.95
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   15.73
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.00 =    4655.00 FEET.

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

```
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.73
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.209
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.43      0.20     0.100    91
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.89      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.707
 SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    3.64
 EFFECTIVE AREA(ACRES) =    106.87   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.69
 TOTAL AREA(ACRES) =      106.9       PEAK FLOW RATE(CFS) =     295.43

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   377.00  DOWNSTREAM(FEET) =   361.00
 FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  46.04
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     295.43
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   15.76
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    4750.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.205
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        1.17      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    3.16
 EFFECTIVE AREA(ACRES) =    108.04   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.69
 TOTAL AREA(ACRES) =      108.0       PEAK FLOW RATE(CFS) =     298.21

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   361.00  DOWNSTREAM(FEET) =   360.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.73
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     298.21
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   15.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    4790.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.79
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.201
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.93      0.20     0.100    91
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.77      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.508
 SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    4.74
 EFFECTIVE AREA(ACRES) =    109.74   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.69
 TOTAL AREA(ACRES) =      109.7       PEAK FLOW RATE(CFS) =     302.64
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      109.7  TC(MIN.) =     15.79
 EFFECTIVE AREA(ACRES) =    109.74  AREA-AVERAGED Fm(INCH/HR)=  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.686
 PEAK FLOW RATE(CFS)   =     302.64

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      278.81   12.02    3.744  0.20( 0.14) 0.69      85.9      11.00
     2      291.90   13.90    3.445  0.20( 0.14) 0.69      98.1      20.00
     3      302.64   15.79    3.201  0.20( 0.14) 0.69     109.7       1.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```



VICINITY MAP
NOT TO SCALE

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 — NODE NUMBER
- A / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Q=xx.0cfs, Tc=x.0 — PEAK FLOW RATE / TIME OF CONCENTRATION
- FQ=xx.0cfs, Tc=x.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- EXISTING STORM DRAIN
- FLOW LINE WITH DIRECTION
- D — SOIL GROUP

SCALE: 1" = 100'

100 50 0 100 200
GRAPHIC SCALE 1"=100'

PREPARED FOR:
LAGUNA NIGUEL PROPERTIES INC
27422 PORTOLA PARKWAY
SUITE 300
FOOTHILL RANCH, CA 92610

PREPARED BY:
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PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

EXHIBIT 1
OFF-SITE HYDROLOGY MAP FOR THE COVE AT EL NIGUEL-TTM 17721
30667 CROWN VALLEY PARKWAY
CITY OF LAGUNA NIGUEL

DATE: May. 13, 2021 09:55:06 AM FILE: F:\1102\Engineering\SY_Hydrology\Off Site Hydrology Study.dwg

HC 17721-17721
HCDRAIN.MAP FOR TM 17721 - THE COVE AT EL NIGUEL

REFER TO EXHIBIT 1 FOR OFF-SITE HYDROLOGY STUDY

VIA ESTORIL

CLUB HOUSE DRIVE

CROWN VALLEY PARKWAY

PLAYA BLANCA DR.

PASEO DEL NIGUEL

ABINGTON COURT

NORTH HAMPTON

PROPERTY BOUNDARY

EX. 36" RCP

EX. 27" RCP

EX. 39" RCP

EX. 42" RCP

EX. 48" RCP

EX. 30" RCP

EX. CATCH BASIN

Q_{10} =168.5cfs
Q_{100}=265.5cfs
t=15.8
Area=94.0 acres

A9 1.96

A8 0.75

A10 1.86

A11 1.46

A12 0.93

A13 0.21

A14 0.75

A15 0.71

A16 1.90

A17 1.02

A18 1.32

A19 1.09

A20 1.70

10

11 516.0 EL.

12

13

14

15

16

17

20 519.0 EL.

21

22

23

24

25

26

27

28

L=70'

L=230'

L=405'

L=265'

L=290'

L=160'

Q_{10} = 5.6cfs
Q_{100} = 8.9cfs
t=11.7
434.0 EL.

Q_{10} = 9.4cfs
Q_{100} =14.9cfs

ΣQ_{10} =176.3cfs
ΣQ_{100}=278.0cfs
t=15.8
409.5 EL.

Q_{10} = 1.6cfs
Q_{100}= 2.5cfs
t=10.9
458.5 EL.

Q_{10} = 1.5cfs
Q_{100}= 2.4cfs
t=11.8
460.0 EL.

Q_{10} = 6.6cfs
Q_{100}=10.4cfs
t=12.7
392.0 EL.

Q_{10} = 2.9cfs
Q_{100}= 4.6cfs
t=12.2
410.0 EL.

ΣQ_{10} =176.3cfs
ΣQ_{100}=278.2cfs
t=16.0
391.0 EL.

Q_{10} = 2.6cfs
Q_{100}= 4.0cfs

Q_{10} = 1.6cfs
Q_{100}= 2.5cfs

Q_{10} = 2.0cfs
Q_{100}= 3.1cfs

ΣQ_{10} =177.3cfs
ΣQ_{100}=280.6cfs
t=16.0
390.0 EL.

Q_{10} = 0.4cfs
Q_{100}= 0.6cfs

ΣQ_{10} =177.3cfs
ΣQ_{100}=280.6cfs
t=16.0
384.0 EL.

ΣQ_{10} = 8.5cfs
ΣQ_{100}=13.4cfs
t=13.0
382.0 EL.

ΣQ_{10} =185.1cfs
ΣQ_{100}=293.0cfs
t=16.1
381.0 EL.

Q_{10} = 2.3cfs
Q_{100} = 3.6cfs

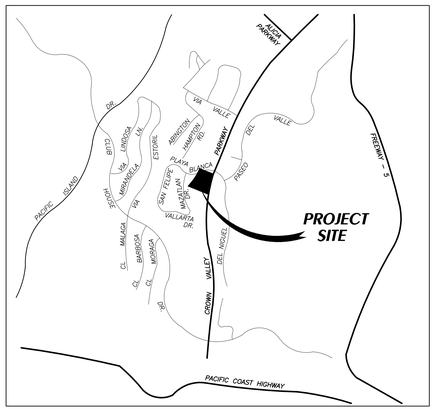
ΣQ_{10} =186.5cfs
ΣQ_{100}=295.4cfs
t=16.1
377.0 EL.

Q_{10} = 2.0cfs
Q_{100}= 3.2cfs

Q_{10} = 3.1cfs
Q_{100}= 4.8cfs

ΣQ_{10} =188.2cfs
ΣQ_{100}=298.2cfs
t=16.1
361.0 EL.

ΣQ_{10} =190.9cfs
ΣQ_{100}=302.6cfs
t=15.5
Total Area=109.7acres



VICINITY MAP
NOT TO SCALE

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 — NODE NUMBER
- A 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Q=xx.0cfs t=15.0 — PEAK FLOW RATE / TIME OF CONCENTRATION
- ΣQ=xx.0cfs t=xx.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- EXISTING STORM DRAIN
- FLOW LINE WITH DIRECTION
- D — SOIL GROUP

SCALE: 1" = 40'

40 20 0 40 80

GRAPHIC SCALE 1"=40'

PREPARED FOR:
LAGUNA NIGUEL PROPERTIES INC
27422 PORTOLA PARKWAY
SUITE 300
FOOTHILL RANCH, CA 92610

PREPARED BY:

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Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

EXHIBIT 2
EXISTING CONDITION HYDROLOGY MAP
THE COVE AT EL NIGUEL-TTM 17721
30667 CROWN VALLEY PARKWAY
CITY OF LAGUNA NIGUEL

HYDROLOGY MAP FOR TTM 17721 - THE COVE AT EL NIGUEL

SECTION 3

PROPOSED CONDITION
HYDROLOGY CALCULATIONS AND MAP

A. 10-YEAR STORM

```
_____________________________________________________________________________
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                        Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for El Niguel - TTM 1721                              *
* Proposed Condition                                                    *
* 10-year Storm                                                         *
 ************************************************************************

  FILE NAME: 17721P.DAT
  TIME/DATE OF STUDY: 11:43 08/18/2021
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    770.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.585
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  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        1.00      0.20     1.000    83   12.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.97

******************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  770.00  DOWNSTREAM ELEVATION(FEET) =  752.00
  STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.73   Tc(MIN.) =   13.32
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.316
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         D        3.60      0.20     0.700    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    7.05
  EFFECTIVE AREA(ACRES) =      4.60    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       8.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.16
  FLOW VELOCITY(FEET/SEC.) =  5.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.00  DOWNSTREAM(FEET) =   730.00
 FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.07
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.95
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   13.53
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     735.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.53
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.295
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       14.70      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   14.70      SUBAREA RUNOFF(CFS) =   28.77
 EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      37.64

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   730.00  DOWNSTREAM(FEET) =   680.00
 FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.64
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   14.11
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1415.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.11
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.241
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       21.30      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   21.30      SUBAREA RUNOFF(CFS) =   40.65
 EFFECTIVE AREA(ACRES) =     40.60   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =       40.6       PEAK FLOW RATE(CFS) =      77.35

****************************************************************************
 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) =   680.00  DOWNSTREAM(FEET) =   612.00
 FLOW LENGTH(FEET) =   840.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.45
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      77.35
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   14.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    2255.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.68
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.190
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         D       20.40      0.20     0.700    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =   20.40      SUBAREA RUNOFF(CFS) =   37.64
 EFFECTIVE AREA(ACRES) =     61.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =       61.0       PEAK FLOW RATE(CFS) =     113.15

****************************************************************************
 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) =   612.00  DOWNSTREAM(FEET) =   533.00
```

```
 FLOW LENGTH(FEET) =  1065.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.30
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     113.15
 PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    3320.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.35
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.134
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         D       15.50      0.20     0.700    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =   15.50      SUBAREA RUNOFF(CFS) =   27.82
 EFFECTIVE AREA(ACRES) =     76.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =       76.5       PEAK FLOW RATE(CFS) =     137.91

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   533.00  DOWNSTREAM(FEET) =   513.00
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.68
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     137.91
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   15.53
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    3595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.53
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.121
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       17.50      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   17.50      SUBAREA RUNOFF(CFS) =   31.51
 EFFECTIVE AREA(ACRES) =     94.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =       94.0       PEAK FLOW RATE(CFS) =     168.49

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   513.00  DOWNSTREAM(FEET) =   498.00
 FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.84
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     168.49
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   15.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    3820.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     14.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   498.00  DOWNSTREAM(FEET) =   409.50
 FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  49.37
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     168.49
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   15.78
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.78
 RAINFALL INTENSITY(INCH/HR) =   2.10
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.65
 EFFECTIVE STREAM AREA(ACRES) =      94.00
 TOTAL STREAM AREA(ACRES) =      94.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     168.49

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =    516.00  DOWNSTREAM(FEET) =    458.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.862
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.75      0.20     1.000    81   10.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      1.62

********************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    458.50  DOWNSTREAM(FEET) =    434.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   405.00   CHANNEL SLOPE =  0.0605
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.500
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.96      0.20     1.000    81
  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) =       3.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.53
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   0.79
  Tc(MIN.) =   11.65
  SUBAREA AREA(ACRES) =     1.96       SUBAREA RUNOFF(CFS) =    4.06
  EFFECTIVE AREA(ACRES) =      2.71     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       5.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.46
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     13.00 =     635.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    409.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =  0.3500
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.493
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.86      0.20     1.000    81
  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) =       7.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  19.64
  AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   0.06
  Tc(MIN.) =   11.71
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    3.84
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       9.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =  20.82
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     14.00 =     705.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.71
  RAINFALL INTENSITY(INCH/HR) =   2.49
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.57
  TOTAL STREAM AREA(ACRES) =       4.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      168.49   15.78    2.101  0.20( 0.13) 0.65      94.0       1.00
      2        9.43   11.71    2.493  0.20( 0.20) 1.00       4.6      11.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      159.30   11.71    2.493  0.20( 0.13) 0.67      74.3      11.00
      2      176.31   15.78    2.101  0.20( 0.13) 0.66      98.6       1.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     176.31    Tc(MIN.) =    15.78
 EFFECTIVE AREA(ACRES) =      98.57   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =       98.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   409.50  DOWNSTREAM(FEET) =   391.00
 FLOW LENGTH(FEET) =   305.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.40
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     176.31
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   15.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    4425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.97
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.087
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        1.46      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.46      SUBAREA RUNOFF(CFS) =    2.48
 EFFECTIVE AREA(ACRES) =    100.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      100.0       PEAK FLOW RATE(CFS) =     176.31
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   390.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.06
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     176.31
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   15.99
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    4450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.99
 *  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
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.93      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.58
 EFFECTIVE AREA(ACRES) =    100.96   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.0       PEAK FLOW RATE(CFS) =     177.31

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =   386.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  25.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.48
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     177.31
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   16.02
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    4510.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.02
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.083
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.07      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.12
 EFFECTIVE AREA(ACRES) =    101.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.0       PEAK FLOW RATE(CFS) =     177.31
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  20.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  37.13
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     177.31
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   16.04
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.04
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.082
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.20      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) =    0.20      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =    101.23   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.2       PEAK FLOW RATE(CFS) =     177.47

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   380.80
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.95
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     177.47
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   16.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4565.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.081
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.10      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.17
 EFFECTIVE AREA(ACRES) =    101.33   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.3       PEAK FLOW RATE(CFS) =     177.53

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   380.80  DOWNSTREAM(FEET) =   380.00
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.45
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     177.53
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   16.13
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    4655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.13
 RAINFALL INTENSITY(INCH/HR) =   2.07
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.67
 EFFECTIVE STREAM AREA(ACRES) =     101.33
 TOTAL STREAM AREA(ACRES) =     101.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     177.53

****************************************************************************
 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) =   265.00
 ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    460.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.765
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.486
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        0.75      0.20     1.000    81   11.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.54
  TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      1.54

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.1724
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.435
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        0.71      0.20     1.000    81
  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) =       2.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.19
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.43
  Tc(MIN.) =   12.20
  SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =    1.43
  EFFECTIVE AREA(ACRES) =      1.46     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       2.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =  12.12
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    392.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1125
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.94
  FLOW VELOCITY(FEET/SEC) =   5.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =   12.65
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.65
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        1.90      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    3.74
  EFFECTIVE AREA(ACRES) =      3.36   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) =       6.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   392.00  DOWNSTREAM(FEET) =   378.00
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.43
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.61
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =     860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.83
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.366
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"              D        1.01      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.01      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      4.37   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =       8.52

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   377.00  DOWNSTREAM(FEET) =   376.50
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   7.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.52
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     885.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.88
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.361
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.32      0.20     1.000    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.62
 EFFECTIVE AREA(ACRES) =      4.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       9.12

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   376.50  DOWNSTREAM(FEET) =   376.00
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.84
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.12
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.08
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =     955.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.08
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.340
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                  D        0.82      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    1.70
 EFFECTIVE AREA(ACRES) =      5.51   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =        5.5       PEAK FLOW RATE(CFS) =      10.73

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   376.00  DOWNSTREAM(FEET) =   375.50
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.78
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.73
 PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =   14.14
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =    1195.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.14
 RAINFALL INTENSITY(INCH/HR) =   2.24
 AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.88
 EFFECTIVE STREAM AREA(ACRES) =       5.51
 TOTAL STREAM AREA(ACRES) =       5.51
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.73

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      161.24   12.08    2.449  0.20( 0.14) 0.68      77.1      11.00
     1      177.53   16.13    2.075  0.20( 0.13) 0.67     101.3       1.00
     2       10.73   14.14    2.238  0.20( 0.18) 0.88       5.5      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      171.35   12.08    2.449  0.20( 0.14) 0.69      81.8      11.00
     2      180.24   14.14    2.238  0.20( 0.14) 0.69      94.9      20.00
     3      187.41   16.13    2.075  0.20( 0.14) 0.68     106.8       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     187.41    Tc(MIN.) =    16.13
```

```
  EFFECTIVE AREA(ACRES) =     106.84   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      106.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    4655.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   380.00  DOWNSTREAM(FEET) =   379.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.91
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     187.41
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   16.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    4735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.068
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.56      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =    107.40   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      107.4       PEAK FLOW RATE(CFS) =     187.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =   360.00
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  20.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  37.30
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     187.41
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     29.00 =    4880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.83      0.20     0.100    75
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.41      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.398
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    2.21
  EFFECTIVE AREA(ACRES) =    108.64   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      108.6       PEAK FLOW RATE(CFS) =     188.54

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.02      0.20     1.000    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.02      SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =    109.66   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      109.7       PEAK FLOW RATE(CFS) =     190.25
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      109.7  TC(MIN.) =     16.29
  EFFECTIVE AREA(ACRES) =    109.66  AREA-AVERAGED Fm(INCH/HR)=  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.678
  PEAK FLOW RATE(CFS)   =     190.25

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      174.63   12.24    2.430  0.20( 0.14) 0.69      84.6      11.00
      2      183.56   14.29    2.224  0.20( 0.14) 0.68      97.7      20.00
      3      190.25   16.29    2.063  0.20( 0.14) 0.68     109.7       1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

B. 100-YEAR STORM

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for El Niguel - TTM 1721                              *
* Proposed Condition                                                    *
* 100-year Storm                                                        *
 ************************************************************************

  FILE NAME: 17721P.DAT
  TIME/DATE OF STUDY: 11:44 08/18/2021
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    770.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.585
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.646
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20     1.000    96   12.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.10
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.10

******************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  770.00  DOWNSTREAM ELEVATION(FEET) =  752.00
  STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.72
  STREET FLOW TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   13.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.538
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         D        3.60      0.20     0.700    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   11.01
  EFFECTIVE AREA(ACRES) =      4.60    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      14.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.20
  FLOW VELOCITY(FEET/SEC.) =  6.24   DEPTH*VELOCITY(FT*FT/SEC.) =   2.15
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.00  DOWNSTREAM(FEET) =   730.00
 FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.13
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.01
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.45
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     735.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.45
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.509
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       14.70      0.20     0.600    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   14.70      SUBAREA RUNOFF(CFS) =   44.84
 EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      58.74

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   730.00  DOWNSTREAM(FEET) =   680.00
 FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.69
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      58.74
 PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   13.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1415.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.434
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       D       21.30      0.20     0.600    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =   21.30      SUBAREA RUNOFF(CFS) =   63.52
 EFFECTIVE AREA(ACRES) =     40.60   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =       40.6       PEAK FLOW RATE(CFS) =     120.94

****************************************************************************
 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) =   680.00  DOWNSTREAM(FEET) =   612.00
 FLOW LENGTH(FEET) =   840.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.58
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     120.94
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   14.48
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    2255.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.48
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.364
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "2 DWELLINGS/ACRE"         D       20.40      0.20     0.700    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
 SUBAREA AREA(ACRES) =   20.40      SUBAREA RUNOFF(CFS) =   59.19
 EFFECTIVE AREA(ACRES) =     61.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =       61.0       PEAK FLOW RATE(CFS) =     177.59

****************************************************************************
 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) =   612.00  DOWNSTREAM(FEET) =   533.00
```

```
  FLOW LENGTH(FEET) =  1065.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.42
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     177.59
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   15.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    3320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"         D       15.50      0.20     0.700    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =   15.50      SUBAREA RUNOFF(CFS) =   43.89
  EFFECTIVE AREA(ACRES) =     76.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =       76.5       PEAK FLOW RATE(CFS) =     217.22

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   533.00  DOWNSTREAM(FEET) =   513.00
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.68
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     217.22
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   15.23
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    3595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.268
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D       17.50      0.20     0.600    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   17.50      SUBAREA RUNOFF(CFS) =   49.58
  EFFECTIVE AREA(ACRES) =     94.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =       94.0       PEAK FLOW RATE(CFS) =     265.52

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   513.00  DOWNSTREAM(FEET) =   498.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  37.56
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     265.52
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   15.33
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    3820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     14.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   498.00  DOWNSTREAM(FEET) =   409.50
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  54.85
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     265.52
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   15.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.43
  RAINFALL INTENSITY(INCH/HR) =   3.24
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =      94.00
  TOTAL STREAM AREA(ACRES) =      94.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     265.52

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =    516.00  DOWNSTREAM(FEET) =    458.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.862
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.967
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BROWN"               D        0.75      0.20     1.000    95   10.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.54
  TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      2.54

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    458.50  DOWNSTREAM(FEET) =    434.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   405.00   CHANNEL SLOPE =  0.0605
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BROWN"               D        1.96      0.20     1.000    95
  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) =       5.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.61
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.70
  Tc(MIN.) =   11.56
  SUBAREA AREA(ACRES) =     1.96       SUBAREA RUNOFF(CFS) =    6.40
  EFFECTIVE AREA(ACRES) =      2.71     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       8.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =  10.61
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     13.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    409.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =  0.3500
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.817
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BROWN"               D        1.86      0.20     1.000    95
  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) =      11.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  22.30
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =   11.62
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    6.05
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =      14.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =  23.57
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     14.00 =     705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.62
  RAINFALL INTENSITY(INCH/HR) =   3.82
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.57
  TOTAL STREAM AREA(ACRES) =       4.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.88

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      265.52   15.43    3.245  0.20( 0.13) 0.65      94.0       1.00
      2       14.88   11.62    3.817  0.20( 0.20) 1.00       4.6      11.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      251.58   11.62    3.817  0.20( 0.13) 0.67      75.4      11.00
      2      278.04   15.43    3.245  0.20( 0.13) 0.66      98.6       1.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     278.04    Tc(MIN.) =    15.43
 EFFECTIVE AREA(ACRES) =      98.57   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =       98.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    4120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   409.50  DOWNSTREAM(FEET) =   391.00
 FLOW LENGTH(FEET) =   305.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.90
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     278.04
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   15.60
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    4425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.224
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        1.46      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.46      SUBAREA RUNOFF(CFS) =    3.97
 EFFECTIVE AREA(ACRES) =    100.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      100.0       PEAK FLOW RATE(CFS) =     278.18

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   390.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.91
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     278.18
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   15.62
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    4450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.222
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.93      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.53
 EFFECTIVE AREA(ACRES) =    100.96   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.0       PEAK FLOW RATE(CFS) =     280.56

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =   386.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.16
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     280.56
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   15.65
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    4510.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.65
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.218
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.07      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.19
 EFFECTIVE AREA(ACRES) =    101.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.0       PEAK FLOW RATE(CFS) =     280.56
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

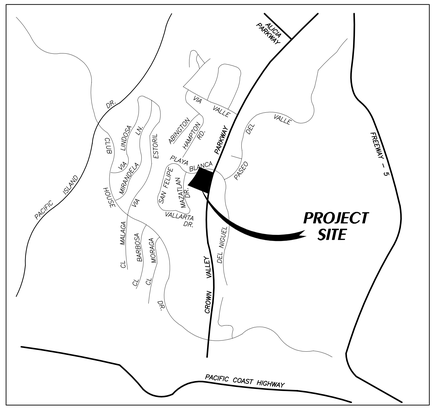
```
****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   386.00  DOWNSTREAM(FEET) =   382.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  41.19
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     280.56
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   15.66
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.20      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.58
 EFFECTIVE AREA(ACRES) =    101.23   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.2       PEAK FLOW RATE(CFS) =     280.83

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   380.80
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.19
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     280.83
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   15.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4565.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.68
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.215
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.10      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.27
 EFFECTIVE AREA(ACRES) =    101.33   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      101.3       PEAK FLOW RATE(CFS) =     280.95

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   380.80  DOWNSTREAM(FEET) =   380.00
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.20
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     280.95
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   15.73
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    4655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.73
 RAINFALL INTENSITY(INCH/HR) =   3.21
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.67
 EFFECTIVE STREAM AREA(ACRES) =     101.33
 TOTAL STREAM AREA(ACRES) =     101.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     280.95

****************************************************************************
 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) =   265.00
 ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    460.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.765
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.789
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.75      0.20     1.000    95   11.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.42
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    410.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.1724
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.720
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        0.71      0.20     1.000    95
 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) =       3.55
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.50
 AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.39
 Tc(MIN.) =   12.15
 SUBAREA AREA(ACRES) =     0.71       SUBAREA RUNOFF(CFS) =    2.25
 EFFECTIVE AREA(ACRES) =      1.46     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       4.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =  13.44
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     555.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    392.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1125
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.62
 FLOW VELOCITY(FEET/SEC) =   6.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   12.56
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     715.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.56
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.90      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    5.90
 EFFECTIVE AREA(ACRES) =      3.36   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) =      10.43

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   392.00  DOWNSTREAM(FEET) =   378.00
 FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.37
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.43
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.72
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =     860.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.72
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.624
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"                D        1.01      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.01      SUBAREA RUNOFF(CFS) =    3.11
 EFFECTIVE AREA(ACRES) =      4.37   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =      13.47

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   377.00  DOWNSTREAM(FEET) =   376.50
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.44
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.47
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.76
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     885.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.617
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "OPEN BRUSH"               D        0.32      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.98
 EFFECTIVE AREA(ACRES) =      4.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      14.42

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   376.50  DOWNSTREAM(FEET) =   376.00
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  13.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.61
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.42
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.94
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =     955.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.589
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D        0.82      0.20     0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.62
 EFFECTIVE AREA(ACRES) =      5.51   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.88
 TOTAL AREA(ACRES) =        5.5       PEAK FLOW RATE(CFS) =      16.92

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   376.00  DOWNSTREAM(FEET) =   375.50
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.92
 PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   13.87
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =    1195.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   13.87
 RAINFALL INTENSITY(INCH/HR) =   3.45
 AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.88
 EFFECTIVE STREAM AREA(ACRES) =       5.51
 TOTAL STREAM AREA(ACRES) =       5.51
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.92

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      255.25   11.95    3.756  0.20( 0.14) 0.68      78.1      11.00
     1      280.95   15.73    3.209  0.20( 0.13) 0.67     101.3       1.00
     2       16.92   13.87    3.449  0.20( 0.18) 0.88       5.5      20.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      271.20   11.95    3.756  0.20( 0.14) 0.69      82.9      11.00
     2      285.22   13.87    3.449  0.20( 0.14) 0.69      95.4      20.00
     3      296.63   15.73    3.209  0.20( 0.14) 0.68     106.8       1.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     296.63    Tc(MIN.) =    15.73
  EFFECTIVE AREA(ACRES) =     106.84   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      106.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    4655.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   380.00  DOWNSTREAM(FEET) =   379.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.60
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     296.63
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   15.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    4735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.202
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.56      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    1.59
  EFFECTIVE AREA(ACRES) =    107.40   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      107.4       PEAK FLOW RATE(CFS) =     296.63
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =   360.00
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  41.91
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     296.63
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   15.84
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     29.00 =    4880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.83      0.20     0.100    91
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.41      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.398
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    3.48
  EFFECTIVE AREA(ACRES) =    108.64   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      108.6       PEAK FLOW RATE(CFS) =     299.23

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.02      0.20     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.02      SUBAREA RUNOFF(CFS) =    2.75
  EFFECTIVE AREA(ACRES) =    109.66   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      109.7       PEAK FLOW RATE(CFS) =     301.98
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      109.7  TC(MIN.) =     15.84
  EFFECTIVE AREA(ACRES) =    109.66  AREA-AVERAGED Fm(INCH/HR)=  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.678
  PEAK FLOW RATE(CFS)   =     301.98

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      277.41   12.07    3.734  0.20( 0.14) 0.69      85.7      11.00
      2      291.36   13.98    3.432  0.20( 0.14) 0.68      98.2      20.00
      3      301.98   15.84    3.195  0.20( 0.14) 0.68     109.7       1.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

REFER TO EXHIBIT 1 FOR OFF-SITE HYDROLOGY STUDY



VICINITY MAP
NOT TO SCALE

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- EXISTING STORM DRAIN
- FLOW LINE WITH DIRECTION
- D — SOIL GROUP
- PROPOSED STORM DRAIN

SCALE: 1" = 40'

GRAPHIC SCALE 1"=40'

PREPARED FOR:
LAGUNA NIGUEL PROPERTIES INC
27422 PORTOLA PARKWAY
SUITE 300
FOOTHILL RANCH, CA 92610

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

EXHIBIT 3
PROPOSED CONDITION HYDROLOGY MAP
THE COVE AT EL NIGUEL-TTM 17721
30667 CROWN VALLEY PARKWAY
CITY OF LAGUNA NIGUEL

SECTION 4

REFERENCES

A. ORANGE COUNTY BASEMAP OF DRAINAGE FACILITIES FROM OC FLOOD CONTROL

N 250145.33
E 6409506.665
E 622406.939
N 250145.056
N 234345.413
E 6409506.448
N 234345.125
E 622406.745

ALISO WOOD CANYONS REGIONAL PARK

Approximate drainage area

Project Site

Scale: 1"=600'

NOTICE

This drainage map has been prepared for information purposes only. The location and ownership of facilities have been determined from available information provided by public agencies, but may not be exact. The user of this map is responsible for verifying exact location, ownership and regional versus local character of drainage facilities.
Additional information may be obtained from public plans and recorded deeds.
Character designations shown on this map are for convenience only and are not controlling. Neither the County of Orange nor The Orange County Flood Control District (OCFCD) assume any liabilities for inaccuracy of this map.

Call Alan Vu at (714) 834-5986 to notify Public Facility and Resources Department (PFRD) of additions or corrections.

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASEMAP
OF DRAINAGE FACILITIES
IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
AVU	JAN.12/2000	70	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- C C Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- Ownership (if other than city or county)
- P Private
- S State
- F Federal

Existing O.C.F.C.D.

Existing LOCAL

- Earth Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Rectangular Channel (base width by height in feet)
- Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
- Reinforced Concrete Pipe (RCP) (diameter in inches)
- Corrugated Metal Pipe (CMP) (diameter in inches)
- Concrete Pipe (diameter in inches)
- Concrete Oval Pipe (width by height in inches)
- Steel Pipe (diameter in inches)
- Reinforced Concrete Arch (base span by height in inches)
- Corrugated Metal Arch (base span by height in inches)

B. STORM DRAIN IMPROVEMENT PLANS FOR TRACT 12431 PREPARED BY WILLIAMSON AND SCHIMID IN 1986

STREET, SEWER, WATER, STORM DRAIN IMPROVEMENT PLANS FOR

AREA G TRACTS 12431 & 12432

BLOCK 4955 MODULE 03,04,05,13,14,15,16,23,26 & 27
STORM DRAIN LINES A,B,C & BB

general notes

STREET IMPROVEMENTS

1. THIS NOTE HEREIN INCORPORATES BY REFERENCE, THOSE GENERAL NOTES NUMBERED 1 THROUGH 17 INCLUSIVE, OF O.C.E.M.A. STANDARD PLAN 89I., 1983 EDITION AND MARCH 1985 SUPPLEMENT.
2. THE DEVELOPER/CONTRACTOR SHALL HAVE A COPY OF CURRENT O.C.E.M.A. STANDARD PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
3. THE DEVELOPER SHALL TELEPHONE EMA PUBLIC WORKS CONSTRUCTION AT 835-3988 AT LEAST 48 HOURS PRIOR TO STARTING CONSTRUCTION WORK SUBJECT TO EMA PUBLIC WORKS INSPECTION.
4. ALL HIGHWAY SIGNS AND STREET NAME SIGNS SHOWN ON THE PLAN MUST BE SUPPLIED AND INSTALLED BY THE DEVELOPER PER O.C.E.M.A. STANDARD PLAN NOS. 907, 908, 909, AND 917.
5. ALL CONCRETE CURB AND GUTTER FLOWLINES WITH LESS THAN 1% GRADE SHALL BE WATER TESTED PRIOR TO FINAL FINISHING TO INSURE PROPER DRAINAGE WITHOUT UNACCEPTABLE HIGH OR LOW SPOTS.
6. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY O.C.E.M.A. REGULATION.
7. ALL DAMAGED CONCRETE SIDEWALKS OR CURBS SHALL BE SAW-CUT TO THE NEAREST TRANSVERSE SCORE MARK OR ADJUSTABLE CONTROL JOINT OR REARRANGED PLANE JOINT AND REPLACED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF O.C.E.M.A. STANDARD PLANS.
8. DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, CLEAN, DUST FREE AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF COUNTY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS. NO STOCKPILING OF BUILDING MATERIALS WITHIN THE COUNTY RIGHT-OF-WAY WITHOUT THE PERMISSION OF COUNTY'S INSPECTOR.
9. PRIOR TO FINAL ACCEPTANCE OF STREET IMPROVEMENTS, ALL STREET PAVEMENT, STRIPING AND STENCILING WITHIN THE PERIMETER OF THE CONSTRUCTION PROJECT WILL BE RESTORED TO A "LIKE NEW" CONDITION, IN A MANNER MEETING THE APPROVAL OF THE DIRECTOR, OF PUBLIC WORKS. ALL STRIPING AND STENCILING SHALL BE ACCORDING TO STANDARD PLAN NO. 891, NOTE 17.
10. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES AND SHALL BE PROTECTED WITH ADEQUATE BARRICADES, LIGHTS, SIGNS AND WARNING DEVICES AS PER THE CURRENT STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION MANUAL OF TRAFFIC CONTROLS, AND TO THE DIRECTIONS OF THE COUNTY'S INSPECTOR.
11. O.C.E.M.A. STANDARD PLANS SHALL TAKE PRECEDENCE OVER ANY CONFLICTS EXCEPT FOR STANDARD PLANS AFFECTING UTILITY COMPANIES, IF THEIR STANDARDS ARE MORE STRINGENT.
12. ANY UTILITIES UNDER PAVED AREAS OF PRIVATE STREETS SHALL HAVE A MINIMUM OF 39" COVER AND DEVELOPER SHALL FURNISH PRIVATE LABORATORY COMPACTION CERTIFICATION FOR ALL UNDERGROUND UTILITIES PRIOR TO ANY PAVING. DEVELOPER SHALL SET UP A MEETING WITH THE INSPECTOR AND THE PRIVATE LABORATORY PRIOR TO TESTING.
13. A.C. PAVEMENT PLACED UNDER CARPORTS/ROOFS SHALL BE SLURRY SEALED BEFORE FINAL ACCEPTANCE.
14. ALL STREET STATIONING REFERS TO CENTERLINE OF STREET.
15. ON ALL STREETS THE HINGE POINT FOR ALL EXCAVATION OR EMBANKMENT SHALL BE A MINIMUM OF TWO FEET OUTSIDE RIGHT-OF-WAY.
16. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
17. ALL INSTALLATIONS AND WORK AFFECTING COUNTY PROPERTIES OR FACILITIES SHALL CONFORM WITH STANDARD SPECIFICATIONS, STANDARD PLANS, AND WITH THE PROVISIONS OF THE CONSTRUCTION PERMIT GRANTED BY COUNTY'S PUBLIC PROPERTY PERMITS DIVISION. CONTRACTOR SHALL MAINTAIN A COPY OF SAID PERMIT AND STAMPED PLANS ON THE JOB SITE. USE OF COUNTY PROPERTY AND CONFORMANCE WITH THE ABOVE SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY COUNTY'S DULY ASSIGNED INSPECTOR.
18. ALL MATERIAL TESTING SHALL BE PROVIDED BY THE CONTRACTOR OR DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE O.C.E.M.A. INSPECTOR.
19. A MINIMUM OF ONE (1) PAVED LANE SHALL BE PROVIDED FOR TRAFFIC CLEARANCE OF TWO FEET (2') ADJACENT TO ANY SURFACE OBSTRUCTION AND A FIVE-FOOT (5') CLEARANCE BETWEEN THE EXCAVATION AND THE TRAVELED WAY, SHALL BE MAINTAINED.
20. ALL NEW STRIPING AND STENCILING SHALL HAVE TWO (2) COATS OF PAINT. THE SECOND COAT SHALL BE APPLIED SEVEN (7) DAYS AFTER THE INITIAL COAT.

SEWER NOTES

1. THE SEWER SYSTEM AS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD DRAWINGS AND SPECIFICATIONS OF MOULTON NIGUEL WATER DISTRICT. CONTRACTOR SHALL KEEP A COPY OF THE STANDARD SPECIFICATIONS AND DRAWINGS ON THE JOB SITE AT ALL TIMES.
2. SEWER CONNECTION: FOUR INCH HOUSE CONNECTION (4" VCP) ARE TO BE CONSTRUCTED FROM THE SEWER MAIN TO THE PROPERTY LINE FOR EACH LOT.
3. ALL SEWER HOUSE CONNECTIONS SHALL BE PLACED PRIOR TO SURFACING OF STREETS. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST 48 HOURS PRIOR TO COMMENCING WORK IN THE SEWERS. PHONE (714) 831-1773 TO ARRANGE FOR INSPECTION.
4. ALL SEWER LENGTHS ARE CALCULATED ON HORIZONTAL DISTANCES.
5. AIR PRESSURE TESTING OF SEWERS: WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE INVERT OF THE UPPER MANHOLE STRUCTURE AND THE INVERT OF THE LOWER MANHOLE STRUCTURE IS MORE THAN 10 FEET (10), THE 8-INCH VCP SEWER AND LATERALS SHALL BE AIR TESTED AS FOLLOWS:

   THE CONTRACTOR SHALL PLUG THE ENDS OF THE SEWER LINES BEING TESTED WITH PLUGS AND BRACE THE ENDS OF THE PIPE WHERE NEEDED. THE LINE SHALL BE SUPPLIED WITH AIR UNTIL 3 1/2 PSI GAGE PRESSURE HAS BEEN REACHED, AT WHICH TIME THE FLOW TO THE PIPE SHALL BE SHUT OFF. THE ENGINEER WILL THEN ACCURATELY DETERMINE THE TIME LOSS OF 1 PSI GAGE PRESSURE IN THE RANGE FROM 3 PSI GAGE PRESSURE TO 2 PSI GAGE PRESSURE. THE INPUT OF AIR SHALL NOT EXCEED 5 PSI GAGE PRESSURE. REGULATED BY A 5 PSI PRESSURE REGULATING VALVE THE AIR TEST EQUIPMENT SHALL BE APPROVED BY THE ENGINEER. THE TIME LOSS OF 1 PSI GAGE PRESSURE SHALL NOT BE LESS THAN SIXTY (60) SECONDS. THE CONTRACTOR SHALL MAKE SUCH REPAIRS AS ARE NECESSARY TO THE SATISFACTION OF THE ENGINEER TO ELIMINATE THE EXCESSIVE LEAKAGE. TEST EQUIPMENT SHALL BE AVAILABLE ON THE JOB AT ALL TIMES WHEN AIR PRESSURE METHOD IS USED.

6. 0 + 00 SHOWN ON SEWER PROFILE DENOTES STATIONING ALONG CENTERLINE SEWER FROM DOWNSTREAM MANHOLE. 0 + 60 SHOWN ON PLAN DENOTES MANHOLE AND WYE STATION FOR SEWER LATERAL, BASED ON SEWER STATIONS.
7. IN ORDER TO PREVENT ACCIDENTAL USE OF THE NEW SEWER PRIOR TO COMPLETION AND ACCEPTANCE, THE OUTLET OR INLET TO EXISTING TIE IN MANHOLE(S) SHALL BE SEALED WITH BROKEN BRICK AND MORTAR. INSTALLATION OF THESE PLUGS SHALL BE APPROVED BY THE ENGINEER. PLUGS SHALL BE REMOVED AT THE TIME OF FINAL ACCEPTANCE.
8. CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITY CROSSINGS BEFORE CONSTRUCTING ANY SEWERS IN THIS PROJECT.
9. VITRIFIED CLAY PIPE STUBS AND THE FIRST JOINT OUT OF MANHOLES SHALL BE ONE FOOT (1) MAXIMUM, MEASURED FROM THE INSIDE WALL OF THE MANHOLE.
10. SURVEYOR TO STAKE THE LOCATION OF ALL WYE FITTINGS. ALL HOUSE LATERALS NOT NORMAL TO STREET SEWER TO HAVE END OF LATERAL AT PROPERTY LINE STAKED AND TIED TO A PROPERTY CORNER AS SHOWN ON THE PLANS.
11. TYPE II BEDDING SHALL BE USED WHERE SILTSTONE, SANDSTONE, OR ROCKY CONDITIONS ARE ENCOUNTERED IN THE PIPE ZONE OR AS DETERMINED BY THE DISTRICT'S INSPECTOR.
12. THE MOULTON NIGUEL WATER DISTRICT WILL INSPECT AND MAINTAIN ALL 8" VCP MAIN LINE SEWERS AND MANHOLES. THE DISTRICT WILL NOT INSPECT OR MAINTAIN 4" AND 6" VCP LATERALS TO THE BUILDINGS. THE ORANGE COUNTY DEPARTMENT OF BUILDING AND SAFETY WILL INSPECT AND VERIFY ALL 4" AND 6" VCP TO THE BUILDINGS.
13. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH 3 COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
14. THE CONTRACTOR SHALL OBTAIN AN EXCAVATION PERMIT FROM THE ORANGE COUNTY ROAD DEPARTMENT PRIOR TO START OF CONSTRUCTION.
15. MOULTON-NIGUEL WATER DISTRICT WILL ACCEPT A.B.S. OR P.V.C. AS AN ALTERNATE TO 8" DIAMETER AND SMALLER V.C.P. SEWER AS SHOWN OR CALLED FOR IN THESE PLANS. (SEE DISTRICT STANDARD PLANS AND SPECIFICATIONS.)
16. "RIM ELEVATION" AS SHOWN ON THESE PLANS IS THE APPROXIMATE ELEVATION OF THE DESIGNED FINISH ROAD SURFACE AT THE CENTERLINE OF THE BASE OF THE MANHOLE. THIS ELEVATION IS FURNISHED AS A CONVENIENCE FOR THE CONTRACTOR AND NOT INTENDED TO BE USED FOR SETTING ACTUAL FINISHED GRADE RINGS AND RIMS.
17. FOR TRENCHES OF 5 FEET OR MORE IN DEPTH, THE CONTRACTOR SHALL SUBMIT TO THE DISTRICT A DETAILED PLAN, SIGNED BY A REGISTERED CIVIL ENGINEER FOR THE STATE OF CALIFORNIA, SHOWING THE DESIGN OF SHORING BRACING, STOPPING OR OTHER PROVISIONS TO BE MADE FOR WORKER PROTECTION. SUBMITTAL SHALL BE MADE PRIOR TO START OF WORK.
18. THE CONTRACTOR SHALL PROTECT IN PLACE ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THE PLANS.

WATER NOTES

1. THE WATER SYSTEM SHALL CONFORM TO THE MOULTON NIGUEL WATER DISTRICTS STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEM AS LAST REVISED, THE CONTRACTOR SHALL HAVE A COPY OF THESE PLANS AND THE STANDARD SPECIFICATIONS ON THE JOB AT ALL TIMES.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH 3 COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. PHONE (714) 831-1773 TO ARRANGE FOR INSPECTION.
4. WATER MAINS SHALL BE INSTALLED 6 FEET OFF THE CURB FACE, UNLESS INDICATED OTHERWISE, AND PRIOR TO PAVING OF THE STREETS.
5. FIRE HYDRANT AND BLOWOFFS SHALL BE INSTALLED PER MOULTON-NIGUEL WATER DISTRICT SPECIFICATIONS. FIRE HYDRANT SHALL BE INSTALLED 24 INCHES FROM THE FACE OF THE CURB WHERE SIDEWALKS ARE NOT ADJACENT TO CURBS. WHERE SIDEWALKS ARE ADJACENT TO CURBS, FIRE HYDRANT SHALL BE PLACED BEHIND THE SIDEWALK AS SHOWN ON DETAIL S-3 OF THE "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEMS". ALL HYDRANTS SHALL BE CENTERED IN A 3'-0" SQUARE, 6" THICK CONCRETE PAD. WHERE HYDRANTS ARE REQUIRED AT STREET INTERSECTIONS, THE EDGE OF THE PAD SHALL BE SET AT THE B.C.R.
6. THE DEVELOPER SHALL FURNISH THE MOULTON NIGUEL WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM OUTSIDE THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
7. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E.C. 244 AFTER INSTALLATION INCLUDING NUTS, BOLTS AND FLANGES.
8. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE MOULTON NIGUEL WATER DISTRICT.
9. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE MOULTON NIGUEL WATER DISTRICT.
10. THE CONTRACTOR SHALL OBTAIN AN EXCAVATION PERMIT FROM THE ORANGE COUNTY ROAD DEPARTMENT PRIOR TO START OF CONSTRUCTION.
11. WATER HOUSE CONNECTION LATERALS SHALL BE INSTALLED TO THE PROPERTY LINE PRIOR TO PAVING OF THE STREET.
12. ALL WATER SERVICES SHALL BE SINGLE SERVICES AND INSTALLED PER MOULTON NIGUEL WATER DISTRICT STANDARD SPECIFICATIONS.
13. WATER LOW FLOW DEVICES SHALL BE PROVIDED FOR ALL UNITS WITHIN THIS DEVELOPMENT IN ACCORDANCE WITH THE DISTRICT RESOLUTION. A COPY OF THIS RESOLUTION CAN BE OBTAINED FROM THE DISTRICT'S OFFICE.
14. ALL LOTS SHALL BE PROVIDED WITH PRESSURE REDUCING VALVES SET AT 80 PSI.
15. ALL VALVES SHALL BE INSTALLED OUTSIDE CROSS-GUTTER. TO ACCOMPLISH THIS, CONTRACTOR MAY DEFLECT WATER MAIN IN THE VICINITY OF CROSS-GUTTERS.

STORM DRAIN NOTES

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 POUNDS PER SQUARE INCH IN 28 DAYS. TYPE OF PORTLAND CEMENT CONCRETE TO BE DETERMINED BY O.C.E.M.A. MATERIALS LAB.
2. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
4. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO ENSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE THERE IS A MINIMUM OF 2 FEET OF FILL ABOVE THE TOP OF PIPE.
5. ALL WORK MUST BE IN CONFORMANCE WITH THE ORANGE COUNTY E.M.A. STANDARD SPECIFICATIONS WHICH MAY BE PURCHASED FROM THE COUNTY AND MUST BE KEPT ON THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE O.C.E.M.A. INSPECTOR AT LEAST TWO (2) WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 834-2531, OR BY WRITING THE ORANGE COUNTY E.M.A., ATTN: CONSTRUCTION, P.O. BOX 4048, SANTA ANA, CALIFORNIA 92702.
7. ALL FILLS MUST BE COMPACTED TO 95% RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216-F, 1963 "FIVE LAYER METHOD". ALL BACKFILL MUST BE FREE OF VEGETABLE MATTER.
8. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
9. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER O.C.E.M.A. STANDARD PLAN 319.
10. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEERING SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
11. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
13. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
14. ALL MATERIAL TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE O.C.E.M.A. MATERIALS LAB IN ACCORDANCE WITH THE NUMBER, LOCATION, AND FREQUENCY REQUESTED BY THE O.C.E.M.A. INSPECTOR.
15. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MIN.
16. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT-OF-WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
17. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
18. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELED TO SPRING LINE.
19. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
20. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAYMATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
21. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT-OF-WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
22. ALL PIPE TO BE BANDED AND GROUTED.
23. R.C.P. SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
24. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15.
25. ALL CATCH BASINS AND LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS.
26. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
27. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONSTRUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR HARMFUL MATERIALS.
28. LOCAL DEPRESSIONS AND CHOKS OF CURB INLETS SHALL NOT BE POURED UNTIL ADJACENT CURB AND GUTTER HAS BEEN POURED.
29. ALL GRADE BREAKS IN R.C.P. STORM DRAINS SHALL BE CONSTRUCTED USING EITHER BEVELED PIPE OR A CONCRETE COLLAR AT CONTRACTOR'S OPTION, UNLESS OTHERWISE NOTED.
30. SPECIAL COVER PIPE SHALL HAVE A MINIMUM OF 1-1/2" CLEAR COVER FROM THE INSIDE OF THE PIPE TO REINFORCING STEEL.

NOTICE TO CONTRACTOR

All underground utilities or structures reported by the owners or others and those shown on the records examined, are indicated with their approximate location and extent. The owners, by accepting these plans or proceeding with improvements pursuant thereto, agree to assume liability and to hold undersigned harmless for any damages resulting from the existence of underground utilities or structures not reported to the undersigned, not indicated on the public records examined, located at variance with those reported or shown on records examined. The contractor is required to take due precautionary measures to protect the utilities or structures shown and any other utilities or structures found at the site. It shall be the contractor's responsibility to notify the owners of the utilities or structures concerned before starting work.

The existence and location of any underground utility pipes or structures shown on this plan are obtained by a search of available records. To the best of our knowledge these are no existing utilities except as shown on these plans. The contractor is required to take due precautionary measures to protect the utilities shown and any other structures not shown on these plans.

All contractors and subcontractors performing work shown on or related to these plans shall conduct their operations so that all employees are provided a safe place to work and the public is protected. All contractors and subcontractors shall comply with the "Occupational Safety and Health Regulations" of the U.S. Department of Labor, and with the State of California Department of Industrial Relations' "Construction Safety Orders."

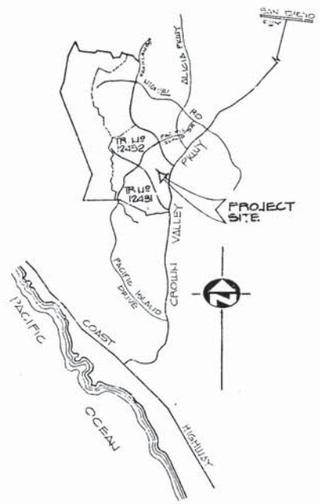
The civil engineer shall not be responsible, in any way for the contractors' and subcontractors' compliance with the "Occupational Safety and Health Regulations" of the U.S. Department of Labor or with the State of California Department of Industrial Relations' "Construction Safety Orders."

Contractor further agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the contractor shall defend, indemnify and hold the owner and the engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this project, excepting for liability arising from the sole negligence of the owner or the engineer.

Bid estimated quantities herein are only for the purpose of obtaining the necessary permits, and Williamson and Schmid does not guarantee the accuracy of the estimated quantities. The contractor shall perform his own quantity takeoff before submitting a bid for any portion of the improvements covered by these plans.

UNAUTHORIZED CHANGES & USES

CAUTION: The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.



vicinity map

drawing index

(SEE SHEET INDEX ON SHT. 2)

ENCROACHMENT PERMIT NO.
86-13972-RT

COUNTY OF ORANGE
E.M.A. TRAFFIC ENGINEERING DIV
THIS PLAN IS SIGNED BY E.M.A. TRAFFIC ENGINEERING DIV. FOR CONCEPT AND ADHERENCE TO COUNTY ZONING AND STRIPING STANDARDS AND REQUIREMENTS ONLY. E.M.A.T.E.D. IS NOT RESPONSIBLE FOR DESIGN ASSUMPTIONS OR ACCURACY.
APPROVED [signature] 9/30/87 EXP. DATE 7/23/86 DATE

REGISTERED PROFESSIONAL ENGINEER JESUS A. MICHEL No. 35217 EXP. 9-30-87 CIVIL STATE OF CALIFORNIA

basis of bearings
BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF CROWN VALLEY PARKWAY AS SHOWN ON THE RECORD OF SURVEY FOR TRACT NO 11101, RECORDED IN BOOK 483, PAGES 19 TO 23 OF MISC. MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA.

county fire marshal
APPROVED FOR FIRE PROTECTION FACILITIES
APPROVED BY [signature] COUNTY FIRE MARSHALL 7-24-86 DATE

bench mark
B.M. "30-44-80", 3½ ALUM. DISC. SET IN CONC. POST, 1.4' W. OF C.F. & 1' N'ly of M.O.C. OF NOSE @ E'LY. END MEDIAN ISLAND @ ENTRANCE TO SO. ORANGE CO. REG. CIVIC CTR. - 62.4' W'LY OF CENTERLINE INT. CROWN VALLEY PKY. & HILLHURST (L. LOWER THAN T.L. - DISC STMPD. "ORANGE COUNTY SURVEYOR BENCH MARK, 30-44-80" ELEV. = 319.047. (1976 ADJ.)

WILLIAMSON SCHMID
17782 SKY PARK BOULEVARD • IRVINE, CALIFORNIA 92714 • (714) 549-2222
APPROVED BY [signature] RCE 22040 4/16/86 DATE

moulton niguel water district
WATER IMPROVEMENTS IMPROVEMENT DISTRICT NO.I
APPROVED BY [signature] 7-31-86
EXP. 9-30-87 21758 RCE DATE
SEWER IMPROVEMENTS IMPROVEMENT DISTRICT NO 1A
APPROVED BY [signature] 7-31-86
EXP. 9-30-87 21758 RCE DATE

COUNTY OF ORANGE
E.M.A. REGULATION DIVISION
THIS PLAN IS SIGNED BY E.M.A. REGULATION FOR CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. E.M.A. REGULATION IS NOT RESPONSIBLE FOR DESIGN ASSUMPTIONS AND ACCURACY
APPROVED [signature] RCE 23796 8-8-86 DATE

owner
LAGUNA NIGUEL PROPERTIES
25200 LA PAZ Rd. SUITE 210
LAGUNA HILLS, CALIF. 92653
(714) 586-4400

IMPROVEMENT PLANS
TITLE SHEET
TRACTS 12431 & 12432
SHEET 1 OF 48 SHEETS
JOB NO 84270-2

FOR ADDITIONAL REVISIONS — SEE SHEET NO. 6

NO	BY	DESCRIPTION	SHT	APPROVED	DATE
13		REVISIONS			
		Rev. intersection on Pacific Island from Sta 90+36.52 to Sta 90+56.52	5, 10, 11	[signature]	11/15/86
		Median curb & pvt @ Sta 103+91.00 Future curb return & Rev. S.D.	5, 30	[signature]	11/6/86
		Line BB13 & Line BB15		[signature]	9/25/86
2		Rev. 8" Sewer on Clubhouse Dr. Sta 3+18.13 to Sta 4+10.67 Remove 8"		[signature]	9/25/86
		Revise from Sta 4+06.13 to Sta 4+17.38 Rem. S.D. and Rev. Sta 3+37.13 to Sta 3+37.13	17-18	[signature]	9/25/86
		Sta 4+47.17, Line BB, 24"RCP	24, 25	[signature]	9/25/86
1		Rev. 8" Sewer C/L House 2*	17, 23	[signature]	10/15/86
		Rev. S.D. Line 'A' from Sta 3+00.81 to Sta 3+45.83		[signature]	10/15/86

LINE B4

SCALE: HORIZ 1"=40' VERT 1"=8'

LINE B-17

SCALE: HORIZ 1"=40' VERT 1"=8'

LINES B2 & B3

LINE B1

PROFILE SCALE
HORIZ: 1"=40
VERT: 1"=8'

CLUBHOUSE DRIVE

TRACT NO. 12431
LOT 4

DETAIL OF MODIFIED JUNCTION STRUCTURE AT STA 7+79.19

SCALE: 1"=2

SECTION A-A

NOTE:
CONTRACTOR TO REMOVE EXIST CONC. COLLAR & HEADWALL AND CONSTRUCT DRAINAGE CHANNEL PER GR. PLAN

CONSTRUCTION NOTES

- (72) CONSTRUCT INLET, TYPE II PER OCEMA STD. 302
- (73) CONSTRUCT INLET, TYPE V PER OCEMA STD. 305
- (74) CONSTRUCT JUNCTION STRUCT. TYPE I PER OCEMA STD 310 L PER PLAN
- (75) CONSTRUCT JUNCTION STRUCT. TYPE II PER OCEMA STD 311
- (78) CONSTRUCT CONC. PIPE SLOPE ANCHORS PER STD 333
- (17) CONSTRUCT 18" RCP D LOAD PER PROFILE
- (23) CONSTRUCT 21" RCP D LOAD PER PROFILE
- (24) CONSTRUCT 36" RCP D LOAD PER PROFILE
- (80) CONSTRUCT VELOCITY REDUCER, PIPE PER DETAIL SHT. NO. 7
- (77) CONSTRUCT CONCRETE COLLAR PER STD. 317.
- (26) CONSTRUCT 30" RCP D LOAD PER PROFILE.
- (27) CONSTRUCT 42" RCP D LOAD PER PROFILE
- (76) CONSTRUCT JUNCTION STRUCTURE TYPE X PER STD. 315

HYDRAULIC DATA

	LINE	STA.	TO STA.	DIA	Q10	Sg	n	Dn	Vn	Dc	Vc	Sf	V
	B	7+68.69	7+79.69	42"	150.4	0.1092	0.13	1.69	33.7	3.39	15.6	—	—
⚠	B	7+79.69	7+90.40	36"	148.4	0.1838	0.13	FULL		2.98	21.0	—	—
	B	7+90.40	9+00.00	36"	148.4	0.4463	0.13	1.20	56.5	3.0	21.0	—	—
	B	9+00.00	9+40.00	36"	148.4	0.2250	0.13	1.44	44.0	3.0	21.0	—	—
	B	9+40.00	9+80.00	36"	148.4	0.4550	0.13	1.19	57.1	3.0	21.0	—	—
	B	9+80.00	9+91.75	36"	148.4	0.1509	0.13	1.60	38.7	3.0	21.0	—	—
	B	10+22.25	12+25.00	36"	148.4	0.1764	0.13	2.09	28.7	3.0	21.0	—	—
	B	12+32.58	14+13.06	36"	123.3	0.1300	0.13	1.70	29.8	2.95	17.5	—	—
	B	14+18.56	15+09.12	33"	115.1	0.1758	0.13	1.81	26.7	2.75	19.4	—	—
	B	15+14.12	16+44.04	33"	109.3	0.0866	0.13	1.73	28.4	2.72	18.4	—	—
⚠	B-1	0+03.50	0+40.22	21"	29.1	0.0050	0.13	1.02	14.5	1.75	17.0	—	—
⚠	B-2	10+02.50	10+35.35	18"	12.1	0.010	0.13	FULL		1.34	7.6	—	—
	B-2	10+35.35	10+42.85	18"	11.3	0.020	0.13	0.78	9.8	1.28	7.0	—	—
⚠	B-3	10+02.50	10+22.22	18"	1.8	0.020	0.13	0.32	5.7	0.50	3.4	—	—
	B-4	0+03.51	0+56.11	18"	6.4	0.050	0.13	0.38	10.2	0.98	5.2	—	—

CURVE DATA

		Δ	R	L	T
	A	94°15'9"	90.00'	100.93'	64.61'
	B	53°30'54"	90.00'	84.06'	45.38'
	C	11°01'25"	595.00'	177.28'	89.80'
⚠	D	11°01'25"	595.00'	95.09'	47.68'
⚠	E	32°20'41"	595.00'	335.89'	172.55'
⚠	F	30°29'29"	45.00'	23.66'	14.88'
⚠	G	63°12'39"	45.00'	49.65	27.69'
	H				

COURSE DATA

	BEARING	DISTANCE
1	N51°14'51"W	7.88'
2	N 0°05'11" E	22.22'
3	N84°54'49" W	35.35'
4	N31°51'06"W	11.56'
5	N 5°55'00"W	6.46'
6	N41°23'43"W	4.50'

SEE SHEET 17 PER STREET IMPROVEMENTS

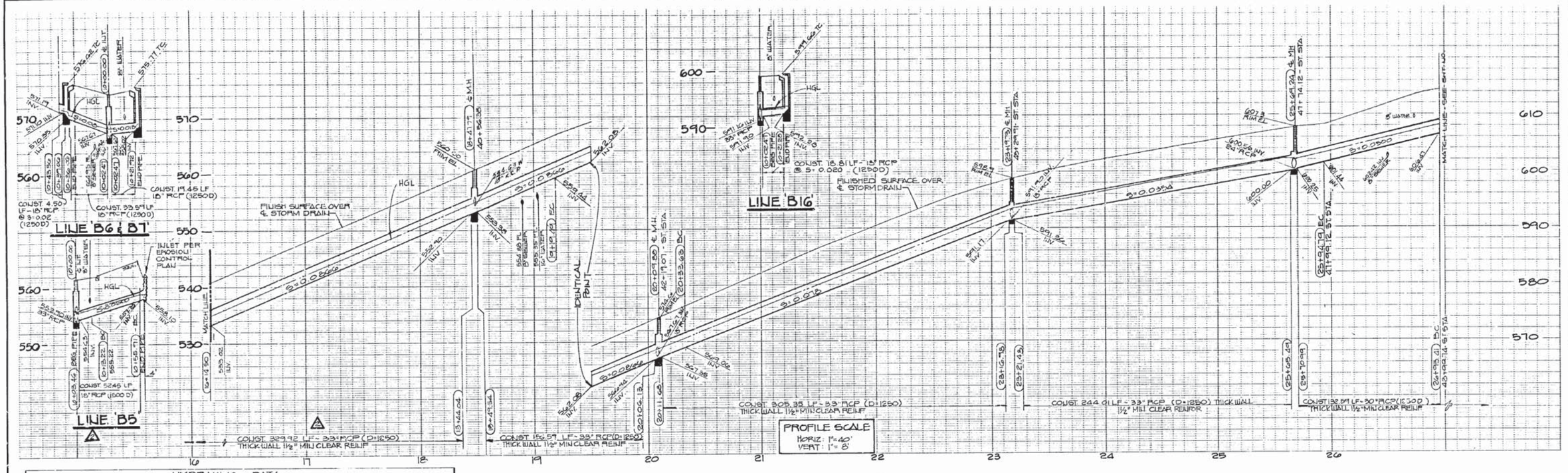
WILLIAMSON AND SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
17782 SKY PARK BOULEVARD • IRVINE, CALIFORNIA 92714 • (714) 261-0222

DESIGNED BY	CMR
DRAWN BY	CMR
CHECKED BY	JAH
FIELD BOOK	

STORM DRAIN PLAN & PROFILE
LINE B STA. 7+68.69 TO STA. 16+14.50
LINE B1, B2, B3 & B4.
TRACT NO 12431

SHEET 24 OF 48 SHEETS
JOB NO. 84371-2

T.R.T.M.P. (12431 + 32)

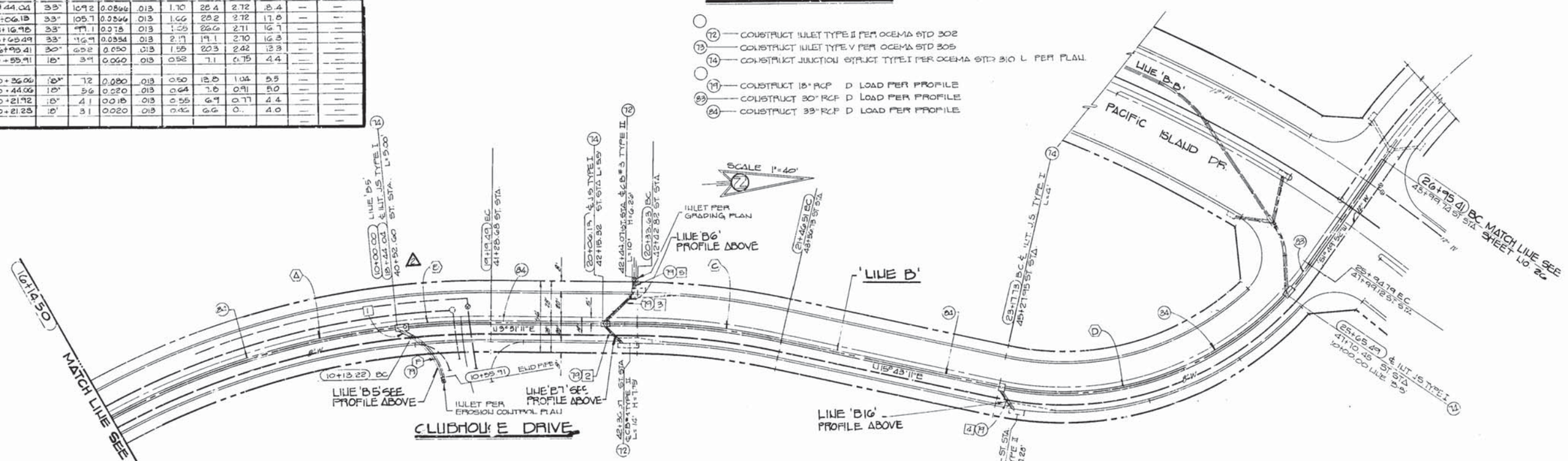


HYDRAULIC DATA

	LINE	STA TO STA	DIA	Q_{10}	S_o	n	D_n	V_n	D_c	V_c	SF	V
Δ	B	15+14.13	18+44.04	33"	109.2	0.0866	.013	1.10	28.4	2.72	18.4	—
Δ	B	18+49.54	20+06.13	33"	105.7	0.0566	.013	1.66	28.2	2.72	17.8	—
	B	20+11.65	23+16.98	33"	99.1	0.038	.013	1.38	26.6	2.71	16.7	—
	B	23+21.48	25+65.49	33"	96.9	0.0354	.013	2.17	19.1	2.70	16.3	—
	E	25+10.99	26+95.41	30"	65.2	0.050	.013	1.55	20.3	2.42	13.3	—
Δ	B5	10+03.46	10+55.91	18"	3.9	0.060	.013	0.52	7.1	0.75	4.4	—
	B6	10+02.47	10+36.06	18"	7.2	0.080	.013	0.50	12.8	1.04	5.5	—
	B6	10+39.56	10+44.06	18"	5.6	0.520	.013	0.64	1.8	0.91	5.0	—
	B7	10+02.47	10+21.92	18"	4.1	0.018	.013	0.55	6.9	0.77	4.4	—
	B16	10+02.47	10+21.28	18"	3.1	0.020	.013	0.42	6.6	0..	4.0	—

CONSTRUCTION NOTES

(12) CONSTRUCT INLET TYPE II PER OCEMA STD 302
(13) CONSTRUCT INLET TYPE V PER OCEMA STD 305
(14) CONSTRUCT JUNCTION STRUCT TYPE I PER OCEMA STD 310 L PER PLAN.
(19) CONSTRUCT 18" RCP D LOAD PER PROFILE
(23) CONSTRUCT 30" RCP D LOAD PER PROFILE
(24) CONSTRUCT 33" RCP D LOAD PER PROFILE



CURVE DATA

		Δ	R	L	T
Δ	A	32°20'41"	595.00'	335.87	172.55'
Δ	B	7°15'54"	595.00'	75.45	37.77'
	C	11° 52' 00"	545.00'	112.85'	56.64'
	D	67° 33' 04"	235.00'	277.06'	157.17'
	E	7° 05' 3. "	235.00'	29.30'	14.67'
Δ	F	54°21'28"	45.00'	42.69'	23.11'

COURSE DATA

	BEARING	DISTANCE
1	N21°00'00"E	13.22'
2	N48°51'11"E	21.92'
3	N41°08'49"W	36.00'
4	N60°43'11" E	21.28'
5	N.56°05'49" W	4.50'

WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
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DESIGNED BY MV
DRAWN BY JP/CP
CHECKED BY JAM
FIELD BOOK

STORM DRAIN PLAN & PROFILE
LINE B STA. 16+14.50 TO STA. 26+95.41
LINE 'B5, B6, B7 & B16
TRACT Nº 12431

SHEET 25 OF 43 SHEETS
JOB NO. 3-12-10-2

T.R. I.M.P. (12431 & 31)

C. STORM DRAIN AND GRADING IMPROVEMENT PLANS FOR LANDSLIDE REMEDIATION PREPARED BY HUNSAKER & ASSOCIATES IN 2000

CITY OF LAGUNA NIGUEL
ROUGH GRADING PLAN
NIGUEL SUMMIT LANDSLIDES REPAIR- PHASE II

GRADING NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE GRADING CODE OF THE CITY OF LAGUNA NIGUEL AND ANY SPECIAL REQUIREMENTS OF THE PERMIT. A COPY OF THE GRADING CODE AND MANUAL SHALL BE RETAINED ON THE JOB SITE WHILE WORK IS IN PROGRESS. WHEN REFERENCED ON THE PLANS, A COPY OF EMA STANDARD PLANS SHALL ALSO BE RETAINED ON THE SITE.
2. GRADING SHALL NOT BE STARTED WITHOUT FIRST NOTIFYING THE CITY GRADING INSPECTOR. A PRE-GRADING MEETING ON THE SITE IS REQUIRED BEFORE START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, DESIGN CIVIL ENGINEER, SOIL ENGINEER, GEOLOGIST, CITY GRADING INSPECTOR AND WHEN REQUIRED THE ARCHAEOLOGIST AND PALEONTOLOGIST. THE REQUIRED INSPECTIONS FOR GRADING WILL BE EXPLAINED AT THIS MEETING.
3. AN APPROVED COPY OF THE GRADING PLAN SHALL BE ON THE PERMITTED SITE WHILE WORK IS IN PROGRESS.
4. CUT AND FILL SLOPES SHALL BE NO STEEPER THAN TWO FOOT HORIZONTAL TO ONE FOOT VERTICAL (2:1)
5. FILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90% RELATIVE COMPACTION. AGGREGATE BASE FOR ASPHALTIC AREAS SHALL BE COMPACTED TO MINIMUM OF 95% RELATIVE COMPACTION. MAXIMUM DENSITY SHALL BE DETERMINED BY UNIFORM BUILDING CODE STANDARD NO. 70-1 OR APPROVED EQUIVALENT, AND FIELD DENSITY BY UNIFORM BUILDING CODE STANDARD NO. 70-2 OR APPROVED EQUIVALENT.
6. AREAS TO RECEIVE FILL SHALL BE PROPERLY PREPARED AND APPROVED IN WRITING BY THE SOILS ENGINEER AND THE BUILDING OFFICIAL PRIOR TO PLACING FILL.
7. FILLS SHALL BE BENCHED INTO COMPETENT MATERIAL PER EMA STANDARD PLAN NO. 1322.
8. ALL EXISTING FILLS SHALL BE APPROVED BY THE BUILDING OFFICIAL OR REMOVED PRIOR TO PLACING ADDITIONAL FILLS.
9. ANY EXISTING IRRIGATION LINES AND CISTERNS SHALL BE REMOVED, OR CRUSHED IN PLACE, AND APPROVED BY THE BUILDING OFFICIAL AND SOILS ENGINEER.
10. STOCK PILING OF EXCESS MATERIAL SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO EXCAVATION.
11. THE DESIGN ENGINEER, AS A CONDITION OF ROUGH GRADE APPROVAL, SHALL PROVIDE A BLUE TOP WITH ACCOMPANYING WITNESS STAKE, SET AT THE CENTER OF EACH PAD REFLECTING THE PAD ELEVATION FOR PRECISE PERMITS AND A BLUE TOP WITH WITNESS STAKE SET AT THE DRAINAGE SWALE HIGH POINT ELEVATION FOR PRELIMINARY PERMITS.
12. ALL TRENCH BACKFILLS SHALL BE TESTED AND APPROVED BY THE SOILS ENGINEER PER THE GRADING CODE.
13. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL, AFTER CLEARING AND PRIOR TO THE PLACEMENT OF FILL IN CANYONS, INSPECT EACH CANYON FOR AREAS OF ADVERSE STABILITY AND TO DETERMINE THE PRESENCE OR ABSENCE OF SUBSURFACE WATER OR SPRING FLOW. IF NEEDED, SUBDRAINS WILL BE DESIGNED AND CONSTRUCTED PRIOR TO THE PLACEMENT OF FILL IN EACH RESPECTIVE CANYON.
14. SUBDRAIN OUTLETS SHALL BE COMPLETED AT THE BEGINNING OF THE SUBDRAIN CONSTRUCTION.
15. THE EXACT LOCATION OF THE SUBDRAINS SHALL BE SURVEYED IN THE FIELD FOR LINE/GRADE AND REFLECTED ON AS-GRADED PLANS.
16. ALL CUT SLOPES SHALL BE INVESTIGATED BOTH DURING AND AFTER GRADING BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER TO DETERMINE IF ANY SLOPE STABILITY PROBLEMS EXIST. SHOULD EXCAVATION DISCLOSE ANY GEOLOGICAL HAZARDS OR POTENTIAL GEOLOGICAL HAZARDS, THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL SUBMIT RECOMMENDED TREATMENT TO THE BUILDING OFFICIAL FOR APPROVAL.
17. WHERE SUPPORT OR BUTTRESSING OF CUT AND NATURAL SLOPES IS DETERMINED TO BE NECESSARY BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER, THE SOIL ENGINEER SHALL SUBMIT DESIGN, LOCATIONS AND CALCULATIONS TO THE BUILDING OFFICIAL PRIOR TO CONSTRUCTION. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL INSPECT AND CONTROL THE CONSTRUCTION OF THE BUTTRESSING AND CERTIFY TO THE STABILITY OF THE SLOPE AND ADJACENT STRUCTURES UPON COMPLETION.
18. WHEN CUT PADS ARE BROUGHT TO NEAR GRADE, THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL DETERMINE IF THE BEDROCK IS EXTENSIVELY FRACTURED OR FAULTED AND WILL READILY TRANSMIT WATER. IF CONSIDERED NECESSARY BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER, A COMPACTED FILL BLANKET WILL BE PLACED.
19. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL PERFORM PERIODIC INSPECTIONS AND SUBMIT A COMPLETE REPORT AND MAP UPON COMPLETION OF THE ROUGH GRADING.
20. THE COMPACTION REPORT AND APPROVAL FROM THE SOIL ENGINEER SHALL INDICATE THE TYPE OF FIELD TESTING PERFORMED. EACH TEST SHALL BE IDENTIFIED WITH THE METHOD OF OBTAINING THE IN-PLACE DENSITY, WHETHER SAND CONE OR DRIVE RING OR NUCLEAR DEVICE AND SHALL BE SO NOTED FOR EACH TEST. SUFFICIENT MAXIMUM DENSITY DETERMINATIONS SHALL BE PERFORMED TO VERIFY THE ACCURACY OF THE MAXIMUM DENSITY CURVES USED BY THE FIELD TECHNICIAN.
21. THE SOIL ENGINEER AND ENGINEERING GEOLOGIST SHALL PERFORM SUFFICIENT OBSERVATIONS AND BE AVAILABLE DURING GRADING AND CONSTRUCTION TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS AND THE CODE WITHIN THEIR PURVIEW.
22. THE CIVIL ENGINEER SHALL BE AVAILABLE DURING GRADING TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS, CODE AND ANY SPECIAL CONDITIONS OF THE PERMIT WITHIN THEIR PURVIEW.
23. THE PERMITTEE IS RESPONSIBLE FOR DUST CONTROL MEASURES.
24. SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE.
25. THE LOCATION AND PROTECTION OF ALL UTILITIES IS THE RESPONSIBILITY OF THE PERMITTEE.
26. APPROVED PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS SHALL BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING.
27. PRIOR TO FINAL APPROVAL, THE CIVIL ENGINEER SHALL CERTIFY TO THE BUILDING OFFICIAL THE AMOUNT OF EARTH MOVED DURING THE GRADING OPERATION.
28. ASPHALT CONCRETE SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF EMA STANDARD PLAN 1805.
29. AGGREGATE BASE SECTION SHALL BE CONSTRUCTED PER EMA STANDARD PLAN 1804.
30. ALL CONCRETE STRUCTURES THAT COME IN CONTACT WITH THE ON-SITE SOILS SHALL BE CONSTRUCTED WITH TYPE 5 CEMENT, UNLESS DEEMED UNNECESSARY BY SOLUBLE SULPHATE-CONTENT TESTS CONDUCTED BY THE SOIL ENGINEER.
31. EXPORT SOIL MUST BE TRANSPORTED TO A LEGAL DUMP OR TO A PERMITTED SITE APPROVED BY THE CITY GRADING INSPECTOR.
32. SLOPES EXCEEDING 5 FEET IN HEIGHT SHALL BE PLANTED WITH AN APPROVED PLAN MATERIAL. IN ADDITION, SLOPES EXCEEDING 15 FEET IN HEIGHT SHALL BE PROVIDED WITH AN APPROVED IRRIGATION SYSTEM, UNLESS OTHERWISE APPROVED BY THE BUILDING OFFICIAL.
33. THE GRADING CONTRACTOR SHALL SUBMIT A STATEMENT OF COMPLIANCE TO THE APPROVED GRADING PLAN PRIOR TO FINAL APPROVAL.
34. ASPHALT SECTIONS MUST BE PER CODE: PARKING STALLS = 3" A/C OVER 6" A/B, DRIVES 3" A/C OVER 10" (COMM.) 12" (INDUSTRIAL). OR: PRIOR TO ROUGH GRADE RELEASE FOR BUILDING PERMITS BY THE DISTRICT GRADING INSPECTOR, THE SOIL ENGINEER SHALL SUBMIT FOR APPROVAL, PAVEMENT SECTION RECOMMENDATIONS BASED ON "R" VALUE ANALYSIS OF THE SUBGRADE SOILS, AND EXPECTED TRAFFIC INDICES.
35. PRELIMINARY SOIL AND GEOLOGY REPORTS AND ALL SUBSEQUENT REPORTS AS APPROVED BY THE CITY GRADING SECTION ARE CONSIDERED A PART OF THE APPROVED GRADING PLAN.
36. ALL EXISTING DRAINAGE COURSES THROUGH THIS SITE SHALL REMAIN OPEN UNTIL FACILITIES TO HANDLE STORM WATER ARE APPROVED AND FUNCTIONAL; HOWEVER, IN ANY CASE, THE PERMITTEE SHALL BE HELD LIABLE FOR ANY DAMAGE DUE TO OBSTRUCTING NATURAL DRAINAGE PATTERNS.
37. ROOF GUTTERS SHALL BE INSTALLED TO PREVENT ROOF DRAINAGE FROM FALLING ON MANUFACTURED SLOPES.
38. THE PERMITTEE SHALL GIVE REASONABLE NOTICE TO THE OWNER OF ADJOINING LANDS AND BUILDINGS PRIOR TO BEGINNING EXCAVATIONS WHICH MAY AFFECT THE LATERAL AND SUBJACENT SUPPORT OF THE ADJOINING PROPERTY. THE NOTICE SHALL STATE THE INTENDED DEPTH OF EXCAVATION AND WHEN THE EXCAVATION WILL COMMENCE. THE ADJOINING OWNER SHALL BE ALLOWED AT LEAST 30 DAYS AND REASONABLE ACCESS ON THE PERMITTED PROPERTY TO PROTECT HIS STRUCTURE, IF HE SO DESIRES, UNLESS OTHERWISE PROTECTED BY LAW.
39. GRADING CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO BETWEEN 7:00 A.M. AND 6:00 P.M. MONDAY-FRIDAY AND 8:30-6 PM ON SATURDAY AND PROHIBITED ON FEDERAL HOLIDAYS IN ORDER TO MINIMIZE DISRUPTION TO EXISTING RESIDENTIAL NEIGHBORHOODS. PROCEDURES WITH THE HIGHEST NOISE POTENTIAL SHALL BE SCHEDULED FOR THE TIMES WHEN THE AMBIENT NOISE LEVELS ARE HIGHEST. THE CONTRACTOR SHALL BE REQUIRED TO EMPLOY THE QUIETEST AMONG ALTERNATIVE EQUIPMENT OR TO MUFFLE NOISE FROM AVAILABLE EQUIPMENT. [ATTAINABLE NOISE LEVELS ARE SHOWN IN TABLE 4.10.B OF THE FEIR.]

NOTICE TO CONTRACTOR

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

EXISTING UNDERGROUND UTILITIES ARE AS PER AVAILABLE RECORDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION AND ELEVATION IN THE FIELD.

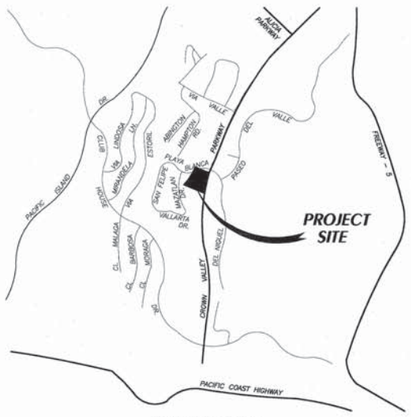
EROSION CONTROL NOTES

40. PERMANENT EROSION CONTROL DEVICES SHALL BE INSTALLED AT COMPLETION OF GRADING. TEMPORARY EROSION CONTROL DEVICES SHALL BE REMOVED AFTER PERMANENT EROSION CONTROL DEVICES ARE INSTALLED AND THEY ARE DEEMED NO LONGER NECESSARY BY THE CITY INSPECTOR.
41. IN CASE OF EMERGENCY CALL: TED GEILEN TELE. NO.: (914) 495-7108
42. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
43. EROSION CONTROL DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE BUILDING OFFICIAL.
44. ALL REMOVABLE EROSION PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40%.
45. AFTER A RAINSTORM ALL SILT AND DEBRIS SHALL BE REMOVED FROM STREETS, CHECK BERMS AND BASINS.
46. GRADED AREAS ON THE PERMITTED AREA PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPES AT THE CONCLUSION OF EACH WORKING DAY. DRAINAGE TO BE DIRECTED TOWARD DESILTING FACILITIES.
47. THE PERMITTEE AND CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.
48. THE UNDERSIGNED CIVIL ENGINEER SHALL INSPECT AND INSURE THAT THE WORK IS IN ACCORDANCE WITH THE APPROVED PLANS.

SIGNATURE _____ DATE _____

ADDITIONAL GRADING NOTES

49. ALL CONSTRUCTION VEHICLES OR EQUIPMENT, FIXED OR MOBILE OPERATED WITHIN 1000' OF A DWELLING SHALL BE EQUIPPED WITH PROPERLY OPERATING AND MAINTAINED MUFFLERS. (ALSO SEE NOTE 39)
50. ALL OPERATIONS SHALL COMPLY WITH ORANGE COUNTY CODIFIED ORDINANCE DIVISION 6 (NOISE CONTROL).
51. STOCKPILINGS AND/OR VEHICLE STAGING AREAS SHALL BE LOCATED AS FAR AS PRACTICABLE FROM DWELLINGS.
52. ISSUANCE OF A GRADING PERMIT DOES NOT ELIMINATE THE NEED FOR PERMITS FROM OTHER AGENCIES WITH REGULATORY RESPONSIBILITIES FOR CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE WORK AUTHORIZED ON THIS PLAN.
53. DURING GRADING OPERATIONS, PERIODIC WATERING OF AFFECTED AREAS SHALL BE REQUIRED CONSISTENT WITH SCAQMD RULE 403.
54. SOIL BINDERS SHALL BE SPREAD ON THE CONSTRUCTION SITE AND UNPAVED PARKING AREAS.
55. CONSTRUCTION EQUIPMENT SHALL BE PROPERLY TUNED AND MAINTAINED TO REDUCE POLLUTANT EMISSIONS.
56. ALL TRUCKS HAULING DIRT, SAND, SOIL, AND OTHER LOOSE MATERIALS TO AND FROM THE PROJECT SITE SHALL BE COVERED.
57. IF VISIBLE SOIL MATERIAL IS CARRIED ONTO ADJACENT PUBLIC PAVED STREETS, THE STREETS SHALL BE SWEPT TO REMOVE THE SOIL MATERIAL AT THE END OF EACH WORK DAY.
58. IF TRACKING OF DIRT BY TRUCKS BECOMES A PROBLEM DURING GRADING OPERATIONS, A TIRE CLEANING DEVICE, SUCH AS "TRACKCLEAN," WILL BE REQUIRED TO BE INSTALLED ON THE PROJECT SITE TO DISLODGE DIRT FROM TRUCK TIRES BEFORE TRUCKS EXIT THE PROJECT SITE.
59. ALL GRADING AND CONSTRUCTION EQUIPMENT SHALL BE EQUIPPED WITH ENGINE MUFFLERS MAINTAINED IN PROPER WORKING ORDER.
60. ALL GRADING/CONSTRUCTION OPERATIONS SHALL BE LIMITED TO THE HOURS OF 7 A.M. TO 8 P.M. MONDAY THROUGH SATURDAY. GRADING/CONSTRUCTION ACTIVITY IS NOT PERMITTED ON ON SUNDAYS AND HOLIDAYS. ALL GRADING AND CONSTRUCTION OPERATION SHALL COMPLY WITH OTHER CITY NOISE REGULATIONS.
61. GRADING AND CONSTRUCTION PERSONNEL SHALL WEAR NOISE PROTECTION GEAR IN ACCORDANCE WITH STATE AND FEDERAL SAFETY REGULATIONS.
62. SOILS REPORT PREPARED BY AMERICAN GEOTECHNICAL, AND DATED APRIL 12, 1999 SHALL BE CONSIDERED A PART OF THESE PLANS.



VICINITY MAP
NOT TO SCALE

UNDERGROUND SERVICE ALERT

Call: Toll FREE 1-800 422-4133

TWO WORKING DAYS BEFORE YOU DIG

"CAUTION"- Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

IMPORTANT NOTICE

Section 4216/4217 of the Government Code requires a Dig alert Identification Number be issued before a "Permit to Excavate" will be valid. For your Dig Alert I.D. Number call Underground Service Alert

TOLL FREE 1-800-422-4133

Two working days before you dig.

INDEX MAP

ESTIMATE OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT
A	CONST. CONC. TERRACE DRAIN PER PF & RD STD. 1321 & DETAIL ON SHT. 2	1725	L.F.
B	CONST. 12" BENCH W/ TERRACE DRAIN PER DETAIL ON SHT.2	1475	L.F.
C	CONST. CONC. DOWN DRAIN PER PF & RD STD. 1321 & DETAIL ON SHT. 2	760	L.F.
D	CONST. SPLASH WALL (L=10') PER DETAIL ON SHT.2	134	L.F.
E	CONST. DOWN DRAIN TO PIPE TRANS. PER PF & RD STD.1331	7	EA.
F	CONST. CONC. DOWN DRAIN PER DETAIL ON SHT. 2	2	L.F.
H	CONST. INTERCEPTOR DRAIN PER PF & RD STD.1332	1400	L.F.
J	INSTALL DESILTING BASIN W/ 60" C.S.P. RISER PER PF & RD STD. 1327	1	EA.
K	REMOVE PORTION OF EXIST. CONC. DRAIN & JOIN	7	L.F.
L	REMOVE & DISPOSE OF EXIST. CONC. DRAINAGE STRUCTURES	1	L.S.
M	CONST. 12"x12" AREA DRAIN W/ 4" DRAIN PIPE PER DETAIL ON SHT. 2	2	EA.
N	CONST. AREA DRAIN CURB OUTLET PER DETAIL ON SHT. 2	2	EA.
O	CONST. STABILIZED CONSTRUCTION ENTRANCE PER DETAIL ON SHT. 2	2	EA.
P	CONST. GUNITE CHANNEL PER DETAIL ON SHT. 2	267	L.F.
Q	PROTECT EXISTING CONCRETE DRAINAGE DITCH	1	L.S.
R	CONST. J.S. TYPE IV PER PF & RD STD. 1313	1	EA.
S	INSTALL 18" R.C.P. (1350-D)	27	L.F.
T	CONST. DRIVEWAY W=15', X=3'	1	EA.
U	CONST. 4" AC OVER 8" BASE	710	S.F.
1	CONTRACTOR TO CONNECT DRAIN OUTLET AT THE FACE OF THE TIE-BACK CAISSON WALL TO A SEPARATE COLLECTOR PIPE (6" PVC), WHICH CAN OUTLET INTO BENCH DRAIN	1	L.S.
2	CONTRACTOR TO EXTEND EXISTING 8" CANYON SUBDRAIN TO NEW DISCHARGE POINT. (NEW 8" PVC PIPE)	1	L.S.
3	INSTALL 8" PVC SUBDRAIN COLLECTOR PIPE TIE-IN. (SCHEMATIC ONLY)	372	L.F.
4	CONSTRUCT 4' PVC SUBDRAIN AT HEEL OF KEYWAY	375	L.F.
	EROSION CONTROL		
10	INSTALL SANDBAG VELOCITY REDUCER PER PF & RD. STD. 1328	1	L.S.
11	CONST. CHECK DAM PER DETAIL ON SHT. 6	1	EA

EARTHWORK QUANTITIES

	CUT	FILL
MASS GRADING	34,812 CYS	113,097 CYS
REMOVAL & RECOMPACT	240,748 CYS	240,748 CYS
STRUCTURAL EXCAVATION	8,000 CYS	8,000 CYS
SUB-TOTAL	283,560 CYS	361,845 CYS
15% SHRINKAGE		42,534 CYS
EXPORT MUD		37,750 CYS
TOTAL	283,560 CYS	442,129 CYS
IMPORT	158,569 CYS	

PLAN INDEX

LEGEND OF ABBREVIATIONS & SYMBOLS

T.C.	TOP OF CURB	(100)	EXIST. CONTOUR
F.L.	FLOWLINE ELEV.	100	PROP. CONTOUR
T.G.	TOP OF GRATE		PROPERTY LINE
G.B.	GRADE BREAK	2%	SHEET FLOW RATE
F.G.	FINISH GRADE		GRADED SWALE
R.G.	ROUGH GRADE		CENTERLINE
F.S.	FINISH SURFACE		SWALE HIGH POINT
INV.	INVERT OF DRAIN		FLOWLINE
T.F.	TOP OF FOOTING ELEV.		SUBDRAIN
L.	LENGTH		AREA DRAIN
N.T.S.	NOT TO SCALE		TOP OF SLOPE
S.D.	STORM DRAIN		TOE OF SLOPE
C/F	CUT/FILL		FIRE HYDRANT
			STREET LIGHT
			WATER METER

NOTES:

1. IMMEDIATELY AFTER GRADING, THE ENTIRE GRADED AREA WILL BE REPLANTED AND LANDSCAPED WITH IN-KIND PLANT MATERIAL TO BLEND IN WITH EXISTING LANDSCAPING. SEPARATE LANDSCAPING AND IRRIGATION PLAN WILL BE REQUIRED.
2. MAINTENANCE RESPONSIBILITY BY NIGUEL SUMMIT COMMUNITY ASSOCIATION.

"AS-BUILT"

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
BY: O.N
DATE OF THIS PLOT
02/17/00

NO.	INIT.	DATE	REVISIONS DESCRIPTION	DATE	APP'D
3	J.K.	02/17/00			"AS-BUILT"
2	J.K.	12/16/99	ADDED DRIVEWAY AT CLUB HOUSE DRIVE, AC PAVING, & CONC. DITCH.		
1	J.K.	12/03/99	ADJUST GRADING ON AREA ALONG INTERIOR PROPERTY LINE.		
2	J.K.	08/06/99	ADJUST GRADING ON NE CORNER AREA TO UTILIZE EXIST. DRAINAGE FACILITY.	08/06/99	"AS-BUILT"
1	J.K.	07/23/99	ADJUST GRADING TO AVOID GRADING ONTO COUNTRY CLUB VILLA APARTMENT PROPERTY.	07/23/99	"AS-BUILT"

BENCH MARK

NORTH ALONG CROWN VALLEY PARKWAY FROM THE INTERSECTION OF NATIONAL PAR OF CLUBHOUSE DRIVE, 415.5 FT. SOUTH OF THE CENTERLINE OF THE SOUTHBOUND LA FT. EAST OF THE CENTER OF THE MEDIAN OF CROWN VALLEY PARKWAY TO THE SOUTH CORNER OF A 3 FT. BY 9.5 FT. CONCRETE CATCH BASIN, 1FT. HIGHER THAN THE GUTTE. 30-31-70. NAVD88: 348.613

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION OPS NO. 7564 AND STATION OPS NO. 7565 BEING N07°48'37"W PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

JOB ADDRESS

VIA ESTORIL
LAGUNA NIGUEL

PERMIT NO.

ARCHAEOLOGIST & PALEONTOLOGIST

SOIL ENGINEER & GEOLOGIST

AMERICAN GEOTECHNICAL
5764 PACIFIC CENTER BLVD
SUITE 112
SAN DIEGO, CA.92121
PHONE:(619) 450-4040

RICHARD K.WALSH R.C.E. 54711

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (714) 583-1010 • FX: (714) 583-0759

PREPARED UNDER THE SUPERVISION OF:

JAMES Y. C. KO R.C.E. 20653 (EXP. 9-30-01) 2/17/00

REGISTERED PROFESSIONAL ENGINEER JAMES KO NO. 20653 Exp. 9/30/01 CIVIL STATE OF CALIFORNIA

PREPARED FOR:

NIGUEL SUMMIT COMMUNITY ASSOCIATION
39 ARGONAUT
SUITE 100
LAGUNA NIGUEL, ORANGE COUNTY

CITY OF LAGUNA NIGUEL

ROUGH GRADING PLAN
LANDSLIDE REMOVAL
LAGUNA NIGUEL

Sheet 1 of 7 Sheets

FILE

M.D. 2326-4 ROUGH GRADING PLAN - NIGUEL SUMMIT LANDSLIDE PHASE II
ROOM BIN DOC. #

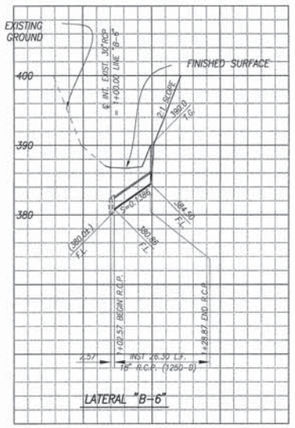
L:\LAGUNA NIGUEL\2326\GRADING\RG\AS-BUILT\SHT01.DWG
02/17/2000

CONSTRUCTION NOTES:

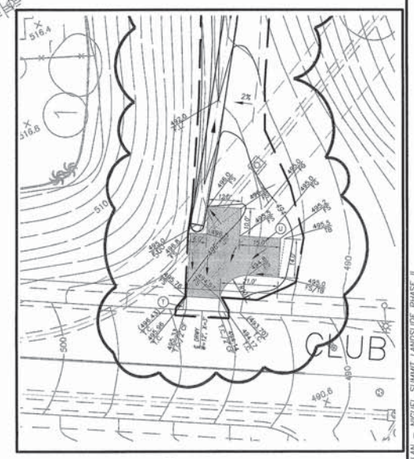
- (A)—CONST. CONC. TERRACE DRAIN PER PF & RD STD. 1321 & DETAIL ON SHT. 2.
- (B)—CONST. 12" BENCH W/ TERRACE DRAIN PER DETAIL ON SHT. 2.
- (C)—CONST. CONC. DOWNDRAIN PER PF & RD STD. 1321 & DETAIL ON SHT. 2
- (D)—CONST. SPLASH WALL (L=10') PER DETAIL ON SHT. 2.
- (E)—CONST. DOWNDRAIN TO PIPE TRANS. PER PF & RD STD. 1331 & DETAIL ON SHT. 2.
- 2 (F)—CONST. TERRACE DRAIN TO PIPE INLET PER DETAIL ON SHT. 2
- (H)—CONST. INTERCEPTOR DRAIN PER PF & RD STD. 1332 ON SHT. 2
- 5 (J)—INSTALL DESILTING BASIN W/ 60" C.G.P. RISER PER PF & RD STD. 1327 — MODIFIED INLET SEE APPROVED STORM DRAIN PLAN
- (K)—REMOVE PORTION OF EXISTING CONC. DRAIN & JOIN
- (L)—REMOVE & DISPOSE OF EX. CONC. DRAINAGE STRUCTURE
- (M)—CONST. 12"x12" AREA DRAIN W/ 4" PVC DRAIN PIPE PER DETAIL ON SHT. 2
- (N)—CONST. AREA DRAIN CURB OUTLET PER DETAIL ON SHT. 2
- (P)—CONST. GUNITE CHANNEL PER DETAIL ON SHT. 2
- 2 (Q)—PROTECT EXISTING CONCRETE DRAINAGE DITCH
- 3 (R)—CONST. J.S. TYPE IV PER PF & RD STD. 1313
- 3 (S)—INSTALL 18" R.C.P. (1250-D)
- 4 (T)—CONST. DRIVEWAY W=12', X=3'
- 4 (U)—CONST. 4" AC OVER 8" BASE
  - BASE COURSE ——— (3/4" III-B-3)
  - SURFACE COURSE ——— (1/2" III-C-3)
  - CRUSHED AGGREGATE BASE —— (SEE NOTE BELOW)

NOTE:
FOR STORM DRAIN IMPROVEMENT SEE SEPARATE PLAN

NOTE:
DEMOLITION OF EXIST. BUILDING PER SEPARATE PLAN



3 STORM DRAIN PROFILE
SCALE: HORIZ. 1" = 40'
VERT. 1" = 8'



4 DETAIL
SCALE: 1" = 20'

"AS-BUILT"

4 CITY OF LAGUNA NIGUEL

SPECIFICATION FOR CRUSHED AGGREGATE BASE

Unless otherwise approved by the City Engineer, the following specification for crushed aggregate base from the Standard Specifications for Public Works Construction (Green book) latest edition shall be applied to all materials to be used as base material under asphalt for street construction. Crushed slag base, crushed miscellaneous base, processed miscellaneous base and select subbase shall not be not be used unless approved by the City Engineer.

200-2.2.1 General.
Crushed aggregate base shall consist entirely of crushed rock and rock dust conforming to the requirements of 200-1.1 and 200-1.2. In the absence of available rock dust, sand of comparable gradation will be acceptable.

200-2.2.2 Grading.
The aggregate shall be uniformly graded and shall conform to TABLE 200-2.2.2 (A).

NO.	INIT.	DATE	DESCRIPTION	DATE	APPROVED
			REVISIONS		
3	J.K.	12/02/99	ADJUST GRADING ON AREA ALONG INTERIOR PROPERTY LINE, AS MARKED		
2	J.K.	08/06/99	ADJUST GRADING ON NE CORNER AREA TO UTILIZE EXIST. DRAINAGE FACILITY, AS MARKED	08/06/99	"AS-BUILT"
1	J.K.	07/23/99	ADJUST GRADING TO AVOID GRADING ONTO COUNTRY CLUB VILLA APARTMENT PROPERTY.	07/23/99	"AS-BUILT"

NO.	INIT.	DATE	DESCRIPTION	DATE	APPROVED
			REVISIONS		
5	J.K.	02/17/00			"AS-BUILT"
4	J.K.	12/16/99	ADDED DRIVEWAY AT CLUB HOUSE DRIVE, AC PAVING & CONC. DITCH, AS MARKED		

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
BY: O.N
DATE OF THIS PLOT
02/17/00

PREPARED BY:
Hunsaker & Associates Irvine, Inc.
Planning · Engineering · Surveying
Three Hughes, Irvine, CA 92718 (714) 583-1010

OWNER:
NIGUEL SUMMIT COMMUNITY ASSOCIATION
39 ARGONAUT, SUIT 100
LAGUNA NIGUEL, ORANGE COUNTY

PRELIMINARY GRADING PLAN
LAGUNA NIGUEL LANDSLIDE
LAGUNA NIGUEL

APR - 5 2000
SHEET 4 OF 7 SHEETS

04/05/00

L:\LAGUNA NIGUEL\2326\GRADING\RD\AS-BUILT\SHT04.DWG

R.D. 2326-4 ROUGH GRADING PLAN - NIGUEL SUMMIT LANDSLIDE PHASE II
ROCKY BIN DOC. #

"AS-BUILT"

SEE SOIL ENGINEER'S FINAL REPORT FOR ADDITIONAL INFORMATION

CONSTRUCTION NOTES: (SCHEMATIC ONLY)

1. CONTRACTOR TO CONNECT DRAIN OUTLET AT THE FACE OF THE TIE-BACK CAISSON WALL TO A SEPARATE COLLECTOR PIPE (6" PVC), WHICH CAN OUTLET INTO BENCH DRAIN.
2. CONTRACTOR TO EXTEND EXISTING 8" CANYON SUBDRAIN TO NEW DISCHARGE POINT. (NEW 8" PVC PIPE)
3. INSTALL 8" PVC SUBDRAIN COLLECTOR PIPE, TIE-IN. (SCHEMATIC ONLY) (TO COLLECT RUNOFF FROM FRENCH DRAIN)

NO.	INIT.	DATE	DESCRIPTION	DATE	APPROVED
3	J.K.	12/02/99	ADJUST GRADING ON AREA ALONG INTERIOR PROPERTY LINE.		
2	J.K.	08/06/99	ADJUST GRADING ON NE CORNER AREA TO UTILIZE EXIST. DRAINAGE FACILITY.	08/06/99	"AS-BUILT"
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REVISIONS

NO.	INIT.	DATE	DESCRIPTION	DATE	APPROVED
5	J.K.	02/17/00			"AS-BUILT"
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REVISIONS

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
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DATE OF THIS PLOT
02/17/00

PREPARED BY:
Hunsaker & Associates Irvine, Inc.
Planning · Engineering · Surveying
Three Hughes, Irvine, CA 92718 (714) 583-1010

OWNER:
NIGUEL SUMMIT COMMUNITY ASSOCIATION
39 ARGONAUT, SUIT 100
LAGUNA NIGUEL, ORANGE COUNTY

SUBSURFACE DRAINAGE PLAN
LAGUNA NIGUEL LANDSLIDE
LAGUNA NIGUEL

APR - 5 2000

SHEET 7 OF 7 SHEETS

L:\LAGUNA NIGUEL\2326\GRADING\RD\AS-BUILT\SHT07.DWG
02/17/2000

R.O. 2326-4 ROUGH GRADING PLAN — NIGUEL SUMMIT LANDSLIDE PHASE II
DOC. #
BIN
ROOM

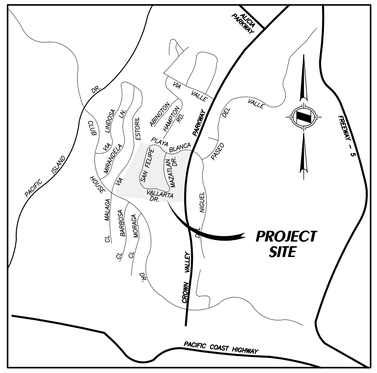
IMPROVEMENT PLANS
NIGUEL SUMMIT LANDSLIDE
STORM DRAIN REPLACEMENT KOIPII
TRACT 9650 AND TRACT 12431
CLUBHOUSE DRIVE

CITY OF LAGUNA NIGUEL STORM DRAIN GENERAL NOTES:

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 POUNDS PER SQUARE INCH. IN 28 DAYS; TYPE OF PORTLAND CEMENT CONCRETE SHALL BE TYPE V.
2. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA REQUIREMENTS.
4. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE THERE IS A MINIMUM OF 2 FEET OF FILL ABOVE THE TOP OF PIPE.
5. ALL WORK MUST BE IN CONFORMANCE WITH THE ORANGE COUNTY E.M.A. STANDARD SPECIFICATIONS AND MUST BE KEPT ON THE JOB AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE CITY OF LAGUNA NIGUEL INSPECTOR AT LEAST TWO (2) WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY FAX 949-362-4385.
7. ALL FILLS MUST BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY THE CALIFORINA TEST METHOD NO. 216, 1978 "FIVE LAYER METHOD" ALL BACKFILL MUST BE FREE OF VEGETABLE MATTER.
8. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE CITY INSPECTOR.
9. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER OCEMA STANDARD PLAN 1319
10. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEER SHALL CERTIFY IN WRITING TO THE CITY INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
11. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION , THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
13. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
14. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION, AND FREQUENCY REQUESTED BY THE CITY INSPECTOR.
15. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MIN.
16. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE CITY FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
17. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
18. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
19. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
20. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO-WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
21. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER CITY INSPECTION AND MEET OR EXCEED CITY MINIMUM STANDARDS. 2 SACK SLURRY TYPE V CEMENT.
22. ALL PIPE TO BE BANDED AND GROUTED.
23. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
24. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15.
25. ALL LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH OCEMA STD. PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
26. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
27. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS OR HARMFUL MATERIALS.
28. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL ADJACENT CURB AND GUTTER HAS BEEN POURED.
29. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE EMA STANDARD PLAN #1308 – TYPE A.
30. CATCH BASIN CURB SUPPORT SHALL BE CONSTRUCTED PER DATAIL "A" AS SHOWN ON OCEMA STD. PLAN NO.1306, SHEET 2 OF 2.

CITY OF LAGUNA NIGUEL GENERAL NOTES:

1. THIS NOTE HEREIN INCORPORATES BY REFERENCE, THOSE GENERAL NOTES NUMBERED 1 THROUGH 17 INCLUSIVE, OF OCEMA STANDARD PLAN 1801, LATEST EDITION AS ADOPTED BY THE CITY OF LAGUNA NIGUEL.
2. THE DEVELOPER / CONTRACTOR SHALL HAVE A COPY OF THE CURRENT OCEMA STANDARD PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
3. THE DEVELOPER SHALL FAX CITY OF LAGUNA NIGUEL INSPECTION AT LEAST 48 HOURS PRIOR TO INSPECTION 949-362-4385.
4. CITY ENCROACHMENT PERMIT REQUIRED. CITY APPROVED PLANS DO NOT RELIEVE CONTRACTOR/DEVELOPER FROM RESPONSIBILITY TO OBTAIN PUBLIC PROPERTY PERMIT WHICH SHALL BE AVAILIABLE AT ALL TIMES WORK IS BEING ACCOMPLISHED IN THE PUBLIC RIGHT OF WAY.
5. ALL CONCRETE CURB AND GUTTER FLOWLINES WITH LESS THAN 1% GRADE SHALL BE WATER TESTED PRIOR TO FINAL FINISHING TO INSURE PROPER DRAINAGE WITHOUT UNACCEPTABLE HIGH OR LOW SPOTS.
6. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY CITY.
7. ALL DAMAGED CONCRETE SIDEWALKS OR CURBS SHALL BE SAWCUT TO THE NEAREST TRANSVERSE SCORE MARK OR ADJUSTABLE CONTROL JOINT OR WEAKENED PLANE JOINT AND REPLACED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF OCEMA STANDARD PLANS.
8. DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, CLEAN, DUST FREE AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF CITY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS. NO STOCKPILING OF BUILDING MATERIALS WITHIN THE CITY RIGHT-OF-WAY WITHOUT THE PERMISSION OF THE CITY'S INSPECTOR.
9. PRIOR TO FINAL ACCEPTANCE OF STREET IMPROVEMENTS, ALL STREET PAVEMENT, STRIPING AND STENCILING WITHIN THE PERIMETER OF THE CONSTRUCTION PROJECT WILL BE RESTORED TO A "LIKE NEW" CONDITION, IN A MANNER MEETING THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS. ALL STRIPING AND STENCILING SHALL BE ACCORDING TO STANDARD PLAN NO.1801, NOTE 17.
10. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES AND SHALL BE PROTECTED WITH ADEQUATE BARRICADES, LIGHTS, SIGNS AND WARNING DEVICES AS PER THE CURRENT STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, MANUAL OF TRAFFIC CONTROLS AND TO THE DIRECTIONS OF THE CITY'S INSPECTOR.
11. OCEMA STANDARD PLANS SHALL TAKE PRECEDENCE OVER ANY CONFLICTS EXCEPT FOR STANDARD PLANS AFFECTING UTILITY COMPANIES, IF THEIR STANDARDS ARE MORE STRINGENT.
12. ANY UTILITIES UNDER PAVED AREAS OF STREETS SHALL HAVE A MINIMUM OF 30" COVER AND DEVELOPER SHALL PROVIDE PRIVATE LABORATORY COMPACTION CERTIFICATION FOR ALL UNDERGROUND UTILITIES PRIOR TO ANY PAVING. DEVELOPER SHALL SET UP A MEETING WITH THE INSPECTOR AND THE PRIVATE LABORATORY PRIOR TO ANY TESTING.
13. A.C. PAVEMENT PLACED UNDER CARPORTS / ROOFS SHALL BE SLURRY SEALED IN ACCORDANCE WITH SECTION 302-4 "EMULSION-AGGREGATE SLURRY" OF THE STD. SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION, 1988 EDITION, BEFORE FINAL ACCEPTANCE.
14. NO CONCENTRATED FLOWS ACROSS ASPHALT PAVEMENT WITHOUT CITY INSPECTOR'S APPROVAL.
15. PAVEMENT SECTION DETERMINED BY OCEMA MATERIALS LAB. 5"AC/ 6"AB (MIN.)
16. ALL CONCRETE (INCLUDING SIDEWALK & C&G) TO BE 560-C 3250 PSI, TYPE V CEMENT.
17. CLUBHOUSE DRIVE SHALL REQUIRE A TYPE II SLURRY SEAL. (FULL WIDTH OF STREET) IN ADDITION TO PAVEMENT REPLACEMENT DETAIL.



VICINITY MAP
NOT TO SCALE

UNDERGROUND SERVICE ALERT

Call:Toll FREE
1-800
422-4133

TWO WORKING DAYS BEFORE YOU DIG

"CAUTION": Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
BY: T.Y.
DATE OF THIS PLOT
12/19/20

ESTIMATE OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT
70	REMOVE EXIST. 42" RCP (BETWEEN STA 5+07± AND 5+80±) AND PLUG END		
	OF EXIST. PIPE WITH BRICK AND MORTAR @ STA 5+80	73	L.F.
71	REMOVE EXIST. 36" RCP (BETWEEN STA 7+93± AND 8+01±) AND PLUG END		
	OF EXIST. PIPE WITH BRICK AND MORTAR @ STA 7+93	8	L.F.
72	REMOVE EXIST. TEMPORARY 36" CSP (BETWEEN STA 5+15± AND 8+30±)	325	L.F.
73	EXTEND EXIST. 8" PVC SUBDRAIN TO EXIST. J.S. @ STA 5+05 (8"PVC DRAIN)	265	L.F.
74	JOIN EXISTING	8	EA.
75	ADJUST MANHOLE SHAFT TO MATCH FINISFED SURFACE	1	L.S.
76	REMOVE EXIST. SHAFT OF J.S. @ STA 7+80 DOWN TO ELEV. 404.5	1	L.S.
77	SLURRY BACKFILL ALL ABANDONMENT PORTION OF J.S. & PIPES (BETWEEN STA 5+80± AND 7+93)	1	L.S.
78	SEAL OPENING OF EXIST. SHAFT WITH STEEL PLATE AFTER THE COMPLETION OF SLURRY BACKFILL	1	L.S.
81	CONST. INLET TYPE V PER P.F. & R.D. STD. PLAN NO. 1305	1	EA.
82	CONST. DOWNDRAIN TO PIPE TRANSITION PER DETAIL ON SHEET 4	4	EA.
93	CONST. J.S. TYPE I PER P.F. & R.D. STD. PLAN NO. 1310	1	EA.
94	CONST. J.S. TYPE IV PER P.F. & R.D. STD. PLAN NO. 1313	5	EA.
97	CONST. CONCRETE COLLAR PER P.F. & R.D. STD. PLAN NO. 1317	2	EA.
98	CONST. SLOPE ANCHOR PER P.F. & R.D. STD. PLAN NO. 1333	3	EA.
99	INST. ENERGY DISSIPATOR RING PER DETAIL ON SHEET 4	3	EA.
100	CONST. 4" AC OVER 8" BASE (20' ACCESS ROAD)	2092	S.Y.
118	INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD)	106	L.F.
124	INST. 24" R.C.P. (SEE PROFILE FOR D-LOAD)	56	L.F.
136	INST. 36" R.C.P. (SEE PROFILE FOR D-LOAD)	16	L.F.
142	INST. 42" R.C.P. (SEE PROFILE FOR D-LOAD)	290	L.F.

NOTICE TO CONTRACTOR

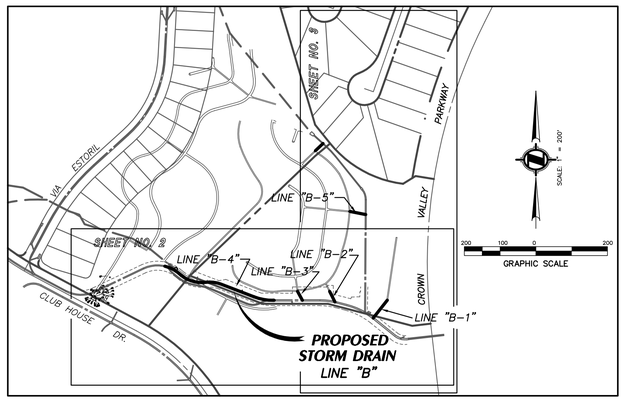
CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

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

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

NOTICE TO CONTRACTOR

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



INDEX MAP

PLAN INDEX

BENCHMARK
NORTH ALONG CROWN VALLEY PARKWAY FROM THE INTERSECTION OF NATIONAL PAR OF CLUBHOUSE DRIVE, 415.5 FT. SOUTH OF THE CENTERLINE OF THE SOUTHBOUND LA FT. EAST OF THE CENTER OF THE MEDIAN OF CROWN VALLEY PARKWAY TO THE SOUTH CORNER OF A 3 FT. BY 9.5 FT. CONCRETE CATCH BASIN, 1FT. HIGHER THAN THE GUTTE.
3U-31-70. NAVD88: 348.613

BASIS OF BEARINGS
THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 7564 AND STATION GPS NO. 7565 BEING N07°48'37"W PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

REGISTERED PROFESSIONAL ENGINEER — JAMES KO — NO. 20653 Exp. 9/30/01 — CIVIL — STATE OF CALIFORNIA

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

TONY YANG 08/03/99 — DESIGNED BY DATE
TONY YANG 08/03/99 — DRAWN BY DATE
JIM KO 08/03/99 — CHECKED BY DATE

PREPARED BY
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

DATE:
JIM KO R.C.E. 20653 EXP. 9/30/01

ENCROACHMENT PERMIT NO. NUMBER
CITY APPROVED PLANS DO NOT RELIEVE CONTRACTOR/DEVELOPER FROM RESPONSIBILITY TO OBTAIN PUBLIC PROPERTY PERMIT WHICH SHALL BE AVAILIABLE ON THE JOB AT ALL TIMES WORK IS BEING ACCOMPLISHED IN THE PUBLIC RIGHT OF WAY.

DEVELOPER:
NIGUEL SUMMIT HOME OWNER ASSOCIATION

SOILS/GEOLOGIST	SITE ADDRESS
AMERICAN GEOTECHNICAL 22725 OLD CANAL ROAD YORBA LINDA, CA 92887 TEL (714) 685-3900 FAX (714) 685-3909	

CITY OF LAGUNA NIGUEL
PUBLIC WORKS DEPARTMENT

APPROVED BY: KEN MONTGOMERY

R.C.E. 22402 EXPIRATION DATE

THIS PLAN IS SIGNED FOR CONCEPT AND ADHERENCE TO STANDARDS AND REQUIREMENTS ONLY.
CITY IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

IMPROVEMENT PLANS

TITLE SHEET

STORM DRAIN REPLACEMENT KOIPII

SHEET 1 OF 4

W.O. 2326-4 PIN: 18-4 DOC. NO.:
STORM DRAIN IMPROVEMENT PLANS

L:\Laguna Niguel\2326\imp\storm\Sht01.dwg

PROFILE SCALES
HORIZ.: 1"= 40'
VERT.: 1"= 8'

∗ NOTE TO CONTRACTOR:
CONTRACTOR TO FIELD VERIFY EXISTING PIPE INVERT PRIOR TO START CONSTRUCTION AND REPORT ANY DISCREPANCIES TO ENGINEER.

NOTE TO CONTRACTOR:
CONTRACTOR IS TO CLEAN ENTIRE EXISTING STORM DRAIN SYSTEM TO THE SATISFACTION OF CITY INSPECTOR PRIOR TO FINAL ACCEPTANCE.

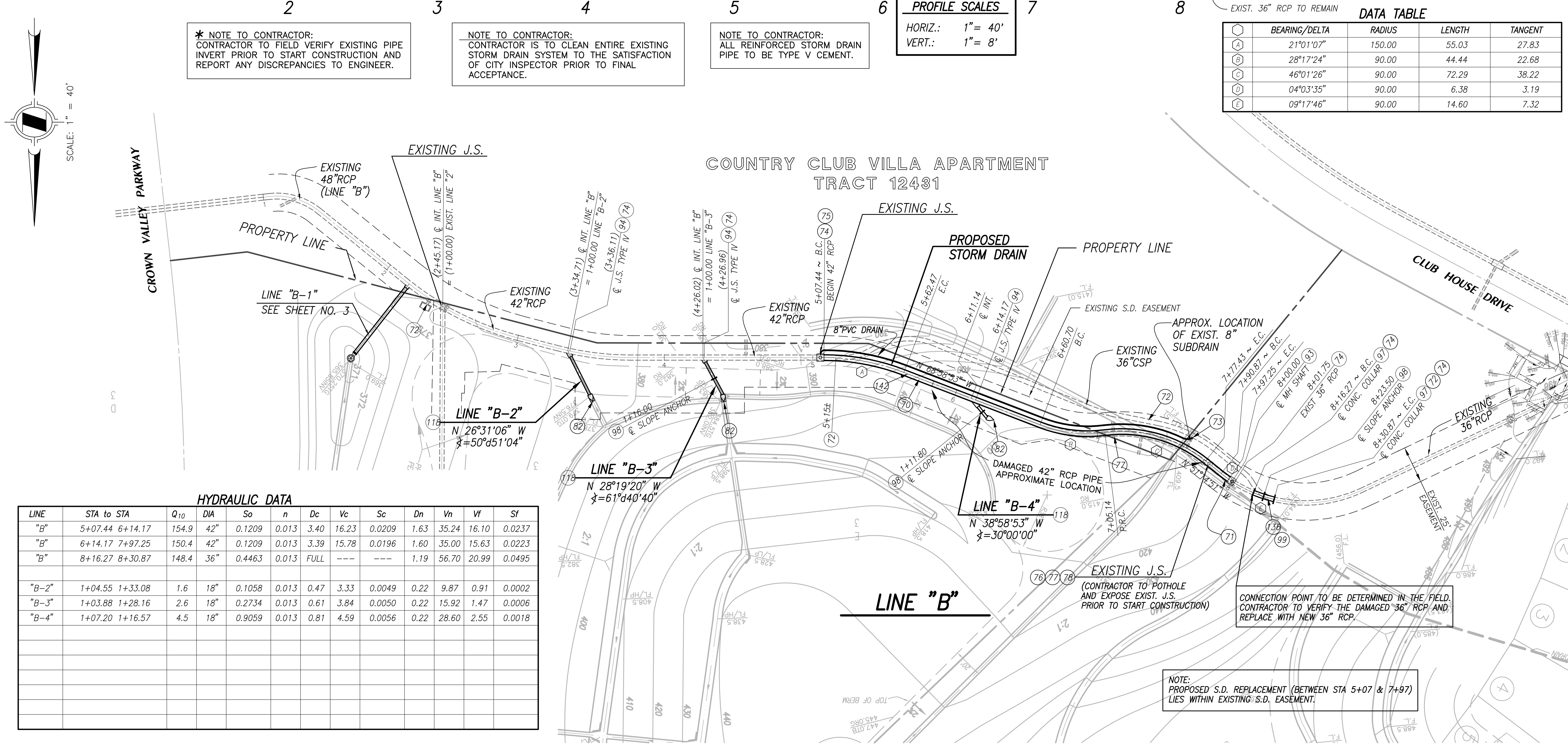
NOTE TO CONTRACTOR:
ALL REINFORCED STORM DRAIN PIPE TO BE TYPE V CEMENT.

DATA TABLE

	BEARING/DELTA	RADIUS	LENGTH	TANGENT
A	21°01'07"	150.00	55.03	27.83
B	28°17'24"	90.00	44.44	22.68
C	46°01'26"	90.00	72.29	38.22
D	04°03'35"	90.00	6.38	3.19
E	09°17'46"	90.00	14.60	7.32

CONSTRUCTION NOTES

- (70) REMOVE EXIST. 42" RCP (BETWEEN STA 5+07± AND 5+80±) AND PLUG END OF EXIST. PIPE WITH BRICK AND MORTAR @ STA 5+80
- (71) REMOVE EXIST. 36" RCP (BETWEEN STA 7+93± AND 8+01±) AND PLUG END OF EXIST. PIPE WITH BRICK AND MORTAR @ STA 7+93
- (72) REMOVE EXIST. TEMPORARY 36" CSP (BETWEEN STA 5+15± AND 8+30±)
- (73) EXTEND EXIST. 8" PVC SUBDRAIN TO EXIST. J.S. @ STA 5+05 (8"PVC DRAIN)
- (74) JOIN EXISTING
- (75) ADJUST MANHOLE SHAFT TO MATCH FINISFED SURFACE
- (76) REMOVE EXIST. SHAFT OF J.S. @ STA 7+80 DOWN TO ELEV. 404.5
- (77) SLURRY BACKFILL ALL ABANDONMENT PORTION OF J.S. & PIPES (BETWEEN STA 5+80± AND 7+93)
- (78) SEAL OPENING OF EXIST. SHAFT WITH STEEL PLATE AFTER THE COMPLETION OF SLURRY BACKFILL
- (82) CONST. DOWNDRAIN TO PIPE TRANSITION PER DETAIL ON SHEET 4
- (93) CONST. J.S. TYPE I PER P.F. & R.D. STD. PLAN NO. 1310
- (94) CONST. J.S. TYPE IV PER P.F. & R.D. STD. PLAN NO. 1313
- (97) CONST. CONCRETE COLLAR PER P.F. & R.D. STD. PLAN NO. 1317
- (98) CONST. SLOPE ANCHOR PER P.F. & R.D. STD. PLAN NO. 1333
- (99) INST. ENERGY DISSIPATOR RING PER DETAIL ON SHEET 4
- (118) INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD)
- (136) INST. 36" R.C.P. (SEE PROFILE FOR D-LOAD)
- (142) INST. 42" R.C.P. (SEE PROFILE FOR D-LOAD)



NOTE:
PROPOSED S.D. REPLACEMENT (BETWEEN STA 5+07 & 7+97) LIES WITHIN EXISTING S.D. EASEMENT.

HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
"B"	5+07.44 6+14.17	154.9	42"	0.1209	0.013	3.40	16.23	0.0209	1.63	35.24	16.10	0.0237
"B"	6+14.17 7+97.25	150.4	42"	0.1209	0.013	3.39	15.78	0.0196	1.60	35.00	15.63	0.0223
"B"	8+16.27 8+30.87	148.4	36"	0.4463	0.013	FULL	---	---	1.19	56.70	20.99	0.0495
"B-2"	1+04.55 1+33.08	1.6	18"	0.1058	0.013	0.47	3.33	0.0049	0.22	9.87	0.91	0.0002
"B-3"	1+03.88 1+28.16	2.6	18"	0.2734	0.013	0.61	3.84	0.0050	0.22	15.92	1.47	0.0006
"B-4"	1+07.20 1+16.57	4.5	18"	0.9059	0.013	0.81	4.59	0.0056	0.22	28.60	2.55	0.0018

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
BY: T.Y.
DATE OF THIS PLOT
12/19/20

IMPROVEMENT PLANS

STORM DRAIN PLAN & PROFILE

(LINE "B", LATERALS "B-2", "B-3", & "B-4")

STORM DRAIN REPLACEMENT KOIPII

W.O. 2326-4 BIN: 198-A DOC. NO.: STORM DRAIN IMPROVEMENT PLANS

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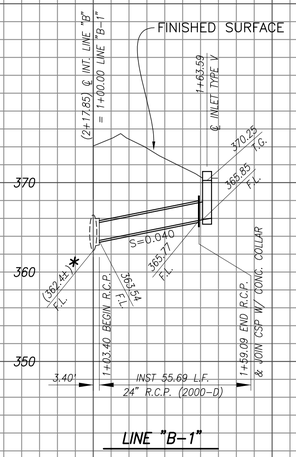
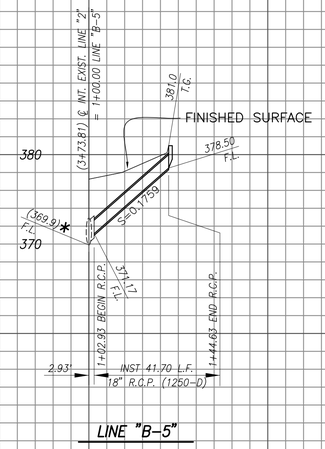


LINE "B-1"



LINE "B-5"

PROFILE SCALES

HORIZ.: 1"= 40'
VERT.: 1"= 8'

* NOTE TO CONTRACTOR:
CONTRACTOR TO FIELD VERIFY EXISTING PIPE INVERT PRIOR TO START CONSTRUCTION AND REPORT ANY DISCREPANCIES TO ENGINEER.

NOTE TO CONTRACTOR:
ALL REINFORCED STORM DRAIN PIPE TO BE TYPE V CEMENT.

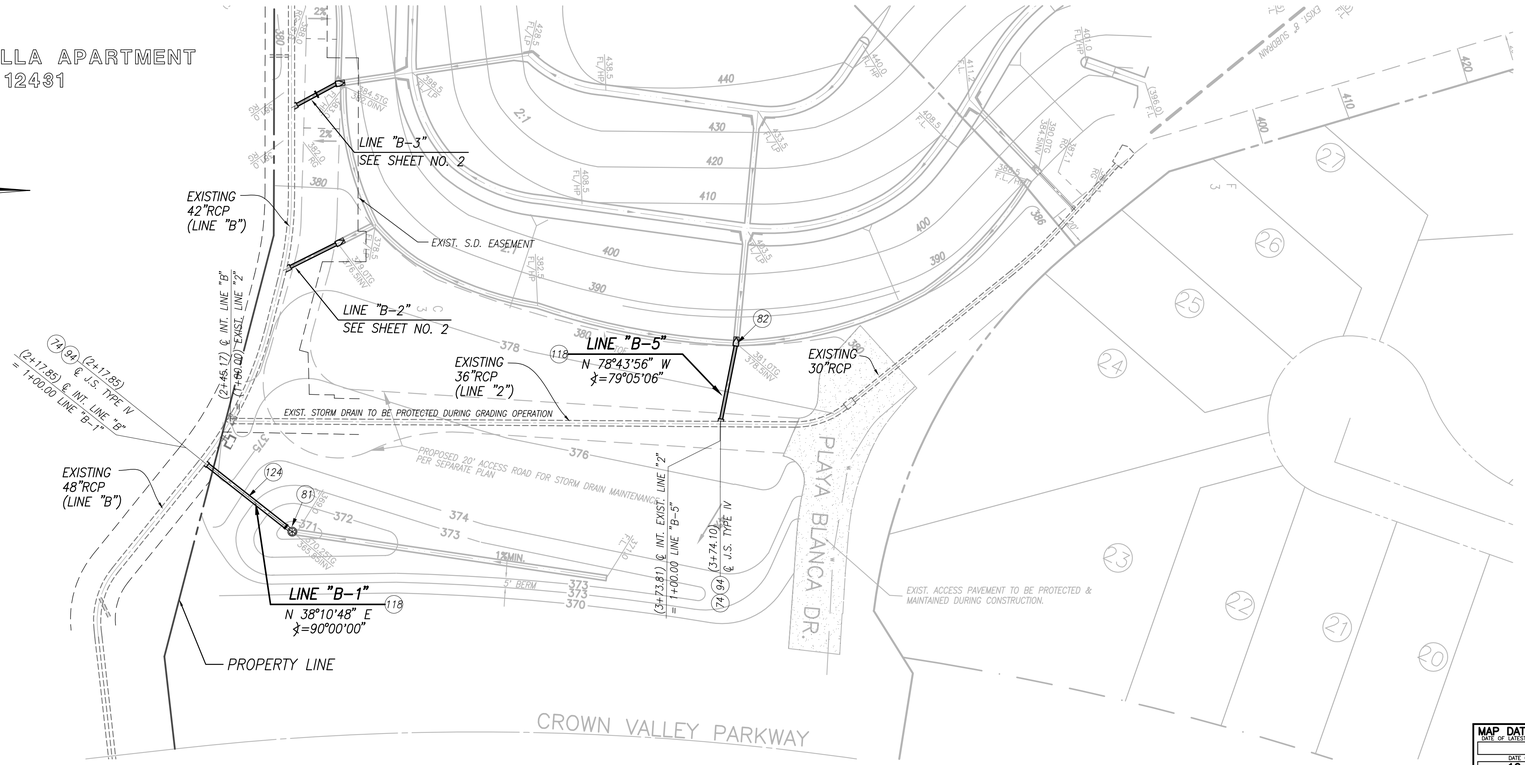
NOTE TO CONTRACTOR:
CONTRACTOR IS TO CLEAN ENTIRE EXISTING STORM DRAIN SYSTEM TO THE SATISFACTION OF CITY INSPECTOR PRIOR TO FINAL ACCEPTANCE.

CONSTRUCTION NOTES

(74) JOIN EXISTING
(81) CONST. INLET TYPE V PER P.F. & R.D. STD. PLAN NO. 1305
(82) CONST. DOWNDRAIN TO PIPE TRANSITION PER DETAIL ON SHEET 4
(94) CONST. J.S. TYPE IV PER P.F. & R.D. STD. PLAN NO. 1313
(118) INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD)
(124) INST. 24" R.C.P. (SEE PROFILE FOR D-LOAD)

COUNTRY CLUB VILLA APARTMENT
TRACT 12431

SCALE: 1" = 40'



HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
"B-1"	1+03.40 1+59.09	3.8	24"	0.0400	0.013	0.68	4.01	0.0045	0.39	8.75	1.21	0.0003
"B-5"	1+02.93 1+44.63	3.1	18"	0.1759	0.013	0.67	4.06	0.0052	0.27	14.37	1.75	0.0009

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
BY: T.Y.
DATE OF THIS PLOT
12/19/20

IMPROVEMENT PLANS

STORM DRAIN PLAN & PROFILE (LATERALS "B-1", & "B-5")

STORM DRAIN REPLACEMENT KOIPII

SHEET 3 OF 4

W.O. 2326-4 BIN: 198-A DOC. NO.: STORM DRAIN IMPROVEMENT PLANS

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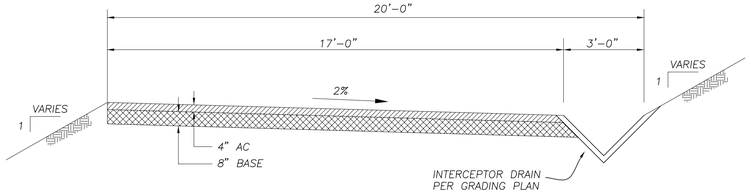
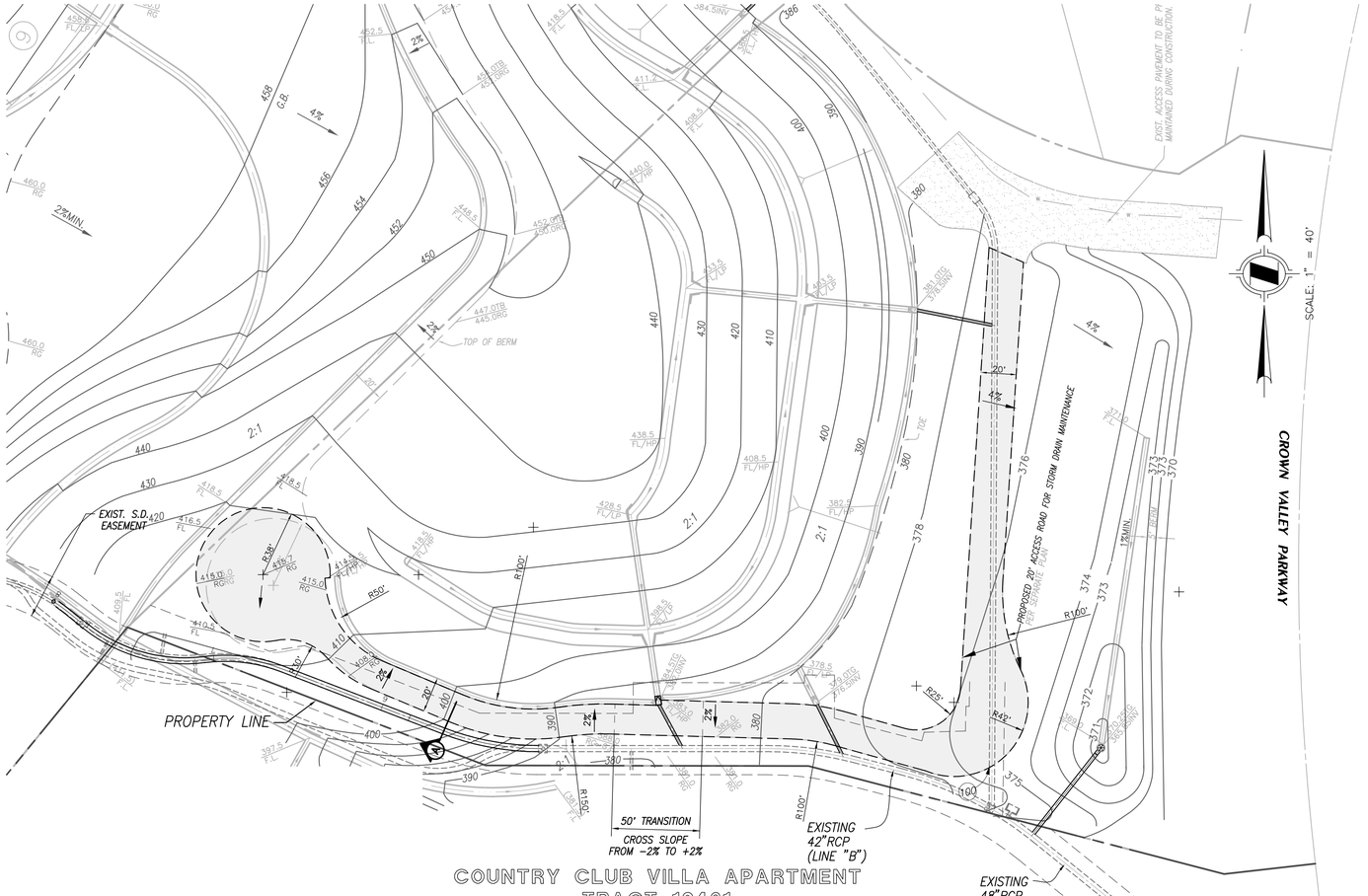


20' ACCESS ROAD

SECTION A–A

N.T.S.



CONSTRUCTION NOTES

(100) CONST. 4" AC OVER 8" BASE (20' ACCESS ROAD)

BASE COURSE ——— (3/4" III-B-3)
SURFACE COURSE ——— (1/2" III-C-3)
CRUSHED AGGREGATE BASE (SEE NOTE BELOW)

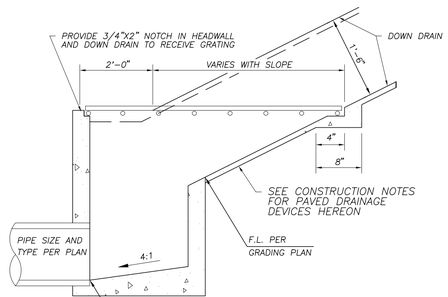
CITY OF LAGUNA NIGUEL

SPECIFICATION FOR CRUSHED AGGREGATE BASE

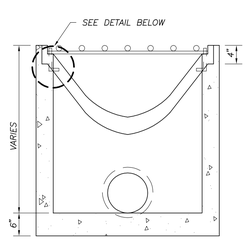
Unless otherwise approved by the City Engineer, the following specification for crushed aggregate base from the Standard Specifications for Public Works Construction (Green book) latest edition shall be applied to all materials to be used as base material under asphalt for street construction. Crushed slag base, crushed miscellaneous base, processed miscellaneous base and select subbase shall not be not be used unless approved by the City Engineer.

200–2.2.1 General.
Crushed aggregate base shall consist entirely of crushed rock and rock dust conforming to the requirements of 200–1.1 and 200–1.2. In the absence of available rock dust, sand of comparable gradation will be acceptable.

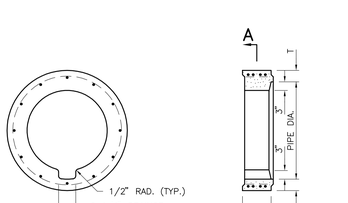
200–2.2.2 Grading.
The aggregate shall be uniformly graded and shall conform to TABLE 200–2.2.2 (A).



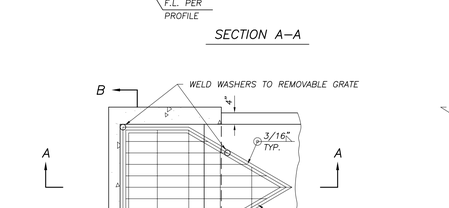
SECTION A–A



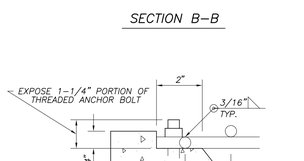
SECTION B–B



SECTION A – A



PLAN VIEW



NOTES:

1. *GROUND SHALL BE PRE-WETTED TO THE SATISFACTION OF THE BUILDING OFFICIAL PRIOR TO PLACEMENT OF CONCRETE.*
2. *MATERIAL FOR CONSTRUCTION OF DOWN DRAIN SHALL BE CONCRETE REINFORCED WITH 6"X6" W1.4XW1.4 WELDED WIRE FABRIC.*
3. *DOWN DRAIN TO PIPE TRANSITION SHALL NOT BE USED WITHIN PUBLIC ROAD RIGHT-OF-WAY.*
4. *GRATE SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.*

GENERAL NOTES

1. CONTACT THE GOVERNMENT AGENCY PRIOR TO MANUFACTURE FOR RECOMMENDED CONCRETE MIX AND TEST PROCEDURE
2. CONCRETE RINGS SHALL BE OF 5000 PSI
3. THE RINGS SHALL BE PRECAST WITH STANDARD TONGUE AND GROVE AS AS SHOWN
4. DRAINAGE NOTCH OF PRECAST SECTIONS SHALL BE PLACED ON THE PIPE INVERT AND CENTERED ON THE PIPE CENTERLINE
5. ALL REINFORCING STEEL SHALL HAVE THE SAME CONCRETE COVER AS THAT OF THE ADJOINING PIPE SECTION
6. CONSTRUCT PRECAST CONCRETE PIPE PER SECTION 207–2 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
7. MINIMUM STRENGTH FOR THE PRECAST PIPE SECTION SHALL BE EQUIVALENT TO ADJOINING CONCRETE PIPE SHOWN ON THE GENERAL PLAN
8. JOINTS BETWEEN THE RINGS AND ADJACENT PIPE SECTIONS SHALL BE SEALED WITH HENRY'S PLASTIC CEMENT #208 ASTM D-2822 OR APPROVED EQUIVALENT BY DESIGN ENGINEER
9. ALL CONCRETE TO BE TYPE V CEMENT.

82 MODIFIED DOWN DRAIN TO PIPE TRANSITION

N.T.S.

99 ENERGY DISSIPATOR RING DETAILS

N.T.S.

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
BY: T.Y.
DATE OF THIS PLOT
12/19/20

IMPROVEMENT PLANS

ACCESS ROAD AND DETAIL

STORM DRAIN REPLACEMENT KOIPII

SHEET 4 OF 4

W.O. 2326-4 BIN. 19B-A DOC. NO.:
STORM DRAIN IMPROVEMENT PLANS

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D. STORM DRAIN IMPROVEMENT PLANS FOR TRACT 9650 PREPARED BY HUNSAKER & ASSOCIATES IN 2000

IMPROVEMENT PLANS FOR TRACT Nº 9650

QUANTITY ESTIMATE

ITEM	QUANTITIES
SEWER	
(1) 8" V.C.P.	1219 L.F.
(2) 48" Dia. Manhole	4 Ea.
(3) Remove Plug & Join	1 Ea.
(4) 8"x10" V.C.P. Reducer	1 Ea.
(5) 60" Dia Manhole	1 Ea.
(6) Saw Cut Remove & Replace Pvmt.	3406 S.F.
(7) 4" V.C.P.	1000 L.F.
(8) Conc. Sewer Encasement	12 L.F.
(9) SPECIAL MANHOLE, 24"	1 EA.
(10)	
WATER	
(11) 8" A.C.P. Class 200	1775 L.F.
(12) 8" Gate Valve	1 Ea.
(13) Fire Hydrant Assembly	4 Ea.
(14) 12"x8" Tapping Sleeve	1 Ea.
(15) 8"x8"x8" Tee	2 Ea.
(16) 90° Ell	3 Ea.
(17) P.C.C. Thrust Block	15 Ea.
(18) Air Release Valve	1 Ea.
(19) Remove Plug & Blow-Off & Join	1 Ea.
(20) Concrete Encasement	10 L.F.
(21) 8" Check Valve	1 Ea.
(22) 8" Butterfly Valve	3 Ea.
(23) 45° Ell	4 Ea.
(24) Standard 2" Service & Meter	10 Ea.
(25) Pressure Reducing Regulator	41 Ea.
(26)	
(27)	
(28)	
(29)	
(30)	
STORM DRAIN	
(31) Join Existing 48" R.C.P.	1 Ea.
(32) 48" R.C.P.-1500 D	143 L.F.
(33) Junction Structure Type VI	3 Ea.
(34) 18" R.C.P.-2000 D	12 L.F.
(35) Inlet Type V	2 Ea.
(36) Inlet Type II	1 Ea.
(37) Local Depression (Modified)	1 Ea.
(38) Junction Structure Type III	1 Ea.
(39) 42" R.C.P.-1700 D	~~527 L.F.~~ 535 L.F.
(40) Concrete Collar	3 Ea.
(41) Inlet Headwall Structure	2 Ea.
(42) Rip-Rap	326 S.F.
(43) 36" R.C.P.-1000 D	341 L.F.
(44) Junction Structure Type I	1 Ea.
(45) 30" R.C.P. - 1000 D	198 L.F.
(46) 18" C.M.P. - 14 Ga.	18 L.F.
(47) A.C. APRON	314 S.F.
(48) Debris Post	3 Ea.
(49) Earth Berm	1 Ea.
STREET	
(50) Metal Beam Guard Rail	20 L.F.
(51) A.C. Over A.B.	45,160 S.F.
(52) Type "D" Curb & Gutter	926 L.F.
(53) Type "B-1" Curb (6" C.F.)	503 L.F.
(54) P.C.C. Valley Gutter	670 L.F.
(55) 2"x6" Redwood Header	850 L.F.
(56) 4" P.C.C. Sidewalk	3,020 S.F.
(57) Driveway Approach (Public)	420 S.F.
(58) Sawcut & Remove Exist C&G	56 L.F.
(59) Street Light	11 Ea.
(60) Traffic Warning Sign	1 Ea.
(61) Mail Box	41 Ea.
(62) Street Name Sign	5 Ea.
(63) Pattern Stamped Concrete	300 S.F.

SEWER NOTES

1. THE SEWER SYSTEM AS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD DRAWINGS AND SPECIFICATIONS OF THE MOULTON-NIGUEL WATER DISTRICT. CONTRACTOR SHALL KEEP A COPY OF THE STANDARD SPECIFICATIONS AND DRAWINGS ON THE JOB SITE AT ALL TIMES.
2. SEWER CONNECTIONS: 4-INCH HOUSE CONNECTIONS (4"-VCP) ARE TO BE CONSTRUCTED FROM THE SEWER MAIN TO THE PROPERTY LINE FOR EACH LOT.
3. ALL SEWER HOUSE CONNECTIONS SHALL BE PLACED PRIOR TO SURFACING OF STREETS.
4. THE DISTRICT'S INSPECTOR SHALL BE NOTIFIED AT LEAST 48 HOURS PRIOR TO COMMENCING WORK ON THE SEWERS. PHONE (714) 752-0505. FOUR (4) COPIES OF THE APPROVED CONSTRUCTION PLANS SHALL BE FURNISHED TO THE OFFICE OF THE DISTRICT'S ENGINEER PRIOR TO REQUEST FOR INSPECTION.
5. ALL SEWER LENGTHS ARE CALCULATED ON HORIZONTAL DISTANCES.

AIR PRESSURE TESTING OF SEWERS

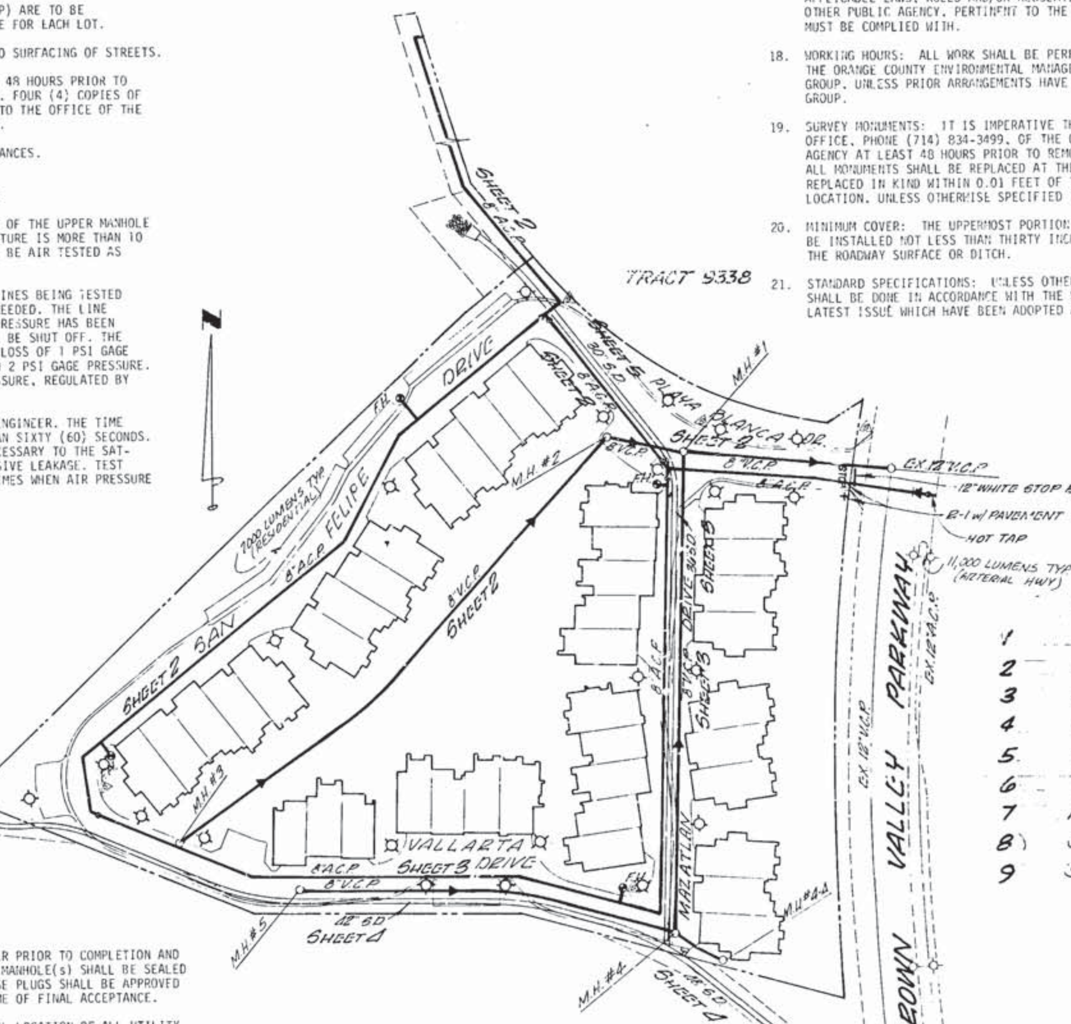
6. WHERE THE DIFFERENCE IN ELEVATION BETWEN THE INVERT OF THE UPPER MANHOLE STRUCTURE AND THE INVERT OF THE LOWER MANHOLE STRUCTURE IS MORE THAN 10 FEET (10'), THE 8-INCH VCP SEWER AND LATERALS SHALL BE AIR TESTED AS FOLLOWS:

   THE CONTRACTOR SHALL PLUG THE ENDS OF THE SEWER LINES BEING TESTED WITH PLUGS AND BRACE THE ENDS OF THE PIPE WHERE NEEDED. THE LINE SHALL BE SUPPLIED WITH AIR UNTIL 3-1/2 PSI GAGE PRESSURE HAS BEEN REACHED, AT WHICH TIME THE FLOW TO THE PIPE SHALL BE SHUT OFF. THE ENGINEER WILL THEN ACCURATELY DETERMINE THE TIME LOSS OF 1 PSI GAGE PRESSURE IN THE RANGE FROM 3 PSI GAGE PRESSURE TO 2 PSI GAGE PRESSURE. THE INPUT OF AIR SHALL NOT EXCEED 5 PSI GAGE PRESSURE, REGULATED BY A 5 PSI PRESSURE REGULATING VALVE.

   THE AIR TEST EQUIPMENT SHALL BE APPROVED BY THE ENGINEER. THE TIME LOSS OF 1 PSI GAGE PRESSURE SHALL NOT BE LESS THAN SIXTY (60) SECONDS. THE CONTRACTOR SHALL MAKE SUCH REPAIRS AS ARE NECESSARY TO THE SATISFACTION OF THE ENGINEER TO ELIMINATE THE EXCESSIVE LEAKAGE. TEST EQUIPMENT SHALL BE AVAILABLE ON THE JOB AT ALL TIMES WHEN AIR PRESSURE METHOD IS USED.

SEWER NOTES (CON'T)

7. IN ORDER TO PREVENT ACCIDENTAL USE OF THE NEW SEWER PRIOR TO COMPLETION AND ACCEPTANCE, THE OUTLET OR INLET TO EXITING TIE-IN MANHOLE(s) SHALL BE SEALED WITH BROKEN BRICK AND MORTAR. INSTALLATION OF THESE PLUGS SHALL BE APPROVED BY THE ENGINEER. PLUGS SHALL BE REMOVED AT THE TIME OF FINAL ACCEPTANCE.
8. CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITY CROSSINGS BEFORE CONSTRUCTING ANY SEWERS IN THIS PROJECT.
9. VITRIFIED CLAY PIPE STUBS AND THE FIRST JOINT OUT OF MANHOLES SHALL BE 1-FOOT (1') MAXIMUM, MEASURED FROM THE INSIDE WALL OF MANHOLE.
10. SURVEYOR TO STAKE THE LOCATION OF ALL WYE FITTINGS. ALL HOUSE LATERALS NOT NORMAL TO STREET SEWER TO HAVE END OF LATERAL AT PROPERTY LINE STAKED AND TIED TO A PROPERTY CORNER AS SHOWN ON THE PLANS.
11. TYPE II BEDDING SHALL BE USED WHERE SILTSTONE, SANDSTONE, OR ROCKY CONDITIONS ARE ENCOUNTERED IN THE PIPE ZONE OR AS DETERMINED BY THE DISTRICT'S INSPECTOR.
12. THE MOULTON-NIGUEL WATER DISTRICT WILL INSPECT AND MAINTAIN ALL 8" VCP MAIN LINE SEWERS AND MANHOLES. THE DISTRICT WILL NOT INSPECT OR MAINTAIN 4" AND 6" VCP LATERALS TO THE BUILDINGS. THE ORANGE COUNTY DEPARTMENT OF BUILDING AND SAFETY WILL INSPECT AND VERIFY ALL 4" x 6" VCP TO THE BUILDINGS.
13. THE CONTRACTOR SHALL OBTAIN AN EXCAVATION PERMIT FROM THE O.C.R.D. PRIOR TO START OF CONSTRUCTION.
14. [0+00] SHOWN ON SEWER PROFILE DENOTES STATIONING ALONG CENTERLINE SEWER FROM DOWNSTREAM MANHOLE. [0+00] SHOWN ON PLAN DENOTES MANHOLE AND WYE STATION FOR SEWER LATERALS, BASED ON SEWER STATIONING.



SHEET INDEX

1	TITLE SHEET
2	SEWER & WATER IMPROVEMENTS
3	SEWER & WATER IMPROVEMENTS
4	STORM DRAIN IMPROVEMENTS
5	STORM DRAIN IMPROVEMENTS
6	PRIVATE STREET IMPROVEM'TS
7	PRIVATE STREET IMPROVEM'TS
8	SURVEY CONTROL MAP
9	SURVEY CONTROL MAP

INDEX MAP
SCALE: 1"=60'

GENERAL NOTES CONT.

16. NOTIFY INSPECTOR: IT IS IMPERATIVE THAT THE PERMITTEE NOTIFY THE ORANGE COUNTY CONSTRUCTION INSPECTOR, AT LEAST 48 HOURS PRIOR TO STARTING WORK UNDER THIS PERMIT. 6-3-29
17. COMPLIANCE: ANY CONDITIONS SHOWN IN THE REGULATIONS, ATTACHMENTS, AND/OR PROVISIONS OF CODIFIED ORDINANCE (6-3-27 TO 6-3-80) AND ALL THE APPLICABLE LAWS, RULES AND/OR REGULATIONS OF ORANGE COUNTY OR ANY OTHER PUBLIC AGENCY, PERTINENT TO THE WORK ON THE FACE OF THIS PERMIT MUST BE COMPLIED WITH.
18. WORKING HOURS: ALL WORK SHALL BE PERFORMED WITHIN THE WORKING HOURS OF THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY PERMIT INSPECTION GROUP, UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE WITH THE INSPECTION GROUP.
19. SURVEY MONUMENTS: IT IS IMPERATIVE THAT THE PERMITTEE NOTIFY THE SURVEY OFFICE, PHONE (714) 834-3499, OF THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY AT LEAST 48 HOURS PRIOR TO REMOVING OR REPLACING ANY SURVEY MONUMENTS. ALL MONUMENTS SHALL BE REPLACED AT THE PERMITTEE'S EXPENSE AND MUST BE REPLACED IN KIND WITHIN 0.01 FEET OF THEIR ORIGINAL HORIZONTAL AND VERTICAL LOCATION, UNLESS OTHERWISE SPECIFIED IN WRITING. SECTION 6-1-31.
20. MINIMUM COVER: THE UPPERMOST PORTION OF ANY PIPELINE OR OTHER FACILITY SHALL BE INSTALLED NOT LESS THAN THIRTY INCHES (30") BELOW THE LOWEST PORTION OF THE ROADWAY SURFACE OR DITCH.
21. STANDARD SPECIFICATIONS: UNLESS OTHERWISE INDICATED ON THE PERMIT, ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STATE OF CALIFORNIA STANDARD SPECIFICATIONS LATEST ISSUE WHICH HAVE BEEN ADOPTED AS THE ORANGE COUNTY STANDARD SPECIFICATIONS.

GENERAL NOTES CONT.

22. TUNNELLING OR BORING: ALL IMPROVED STREETS, AS SHOWN ON THE MASTER PLAN OF HIGHWAYS, MUST BE BORED OR TUNNELLED. ALL BORING, TUNNELLING AND PLACING CONDUITS, CASING AND PIPELINES SHALL BE DONE IN SUCH A MANNER THAT THE EXISTING DRIVING LANES WILL NOT BE DISTURBED. IF A CASING IS INSTALLED TO RECEIVE THE CONDUIT OR PIPLINE, ALL VOIDS BETWEEN THE CASING AND CONDUIT SHALL BE FILLED WITH GROUT OR SAND. BORE PIT SHALL NOT ENCROACH WITHIN 5 FEET FROM EDGE OF PAVEMENT.
23. SERVICE CONNECTIONS: MUST BE INSTALLED AT AN ANGLE OF NINETY (90) DEGREES FROM THE CENTERLINE OF THE COUNTY HIGHWAY WHICH THE MAIN LINE TRAVERSES.

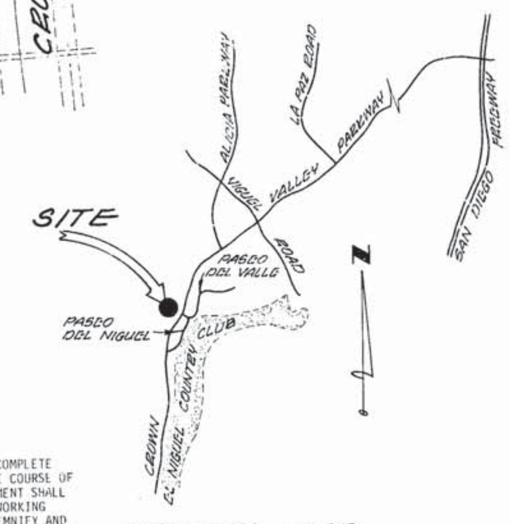
CONDITION: ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY DOES NOT PERFORM ANY INSPECTION UNDER THIS PERMIT PERTAINING TO THE PROTECTION AND SAFETY OF PERSONNEL OR EQUIPMENT. THIS IS THE RESPONSIBILITY OF PERMITTEE. "PERMITEE" SHALL MEAN "CONTRACTOR."

GENERAL NOTES
SEE OCEMA STANDARD PLAN 801

1. ALL WORK SHALL CONFORM TO THE STANDARD SPECIFICATIONS (STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION), STANDARD PLANS OF THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY, DEVELOPMENT, AND THE CURRENT ORANGE COUNTY MANUAL OF WARNING SIGNS, LIGHTS, AND DEVICES FOR USE IN WORK UPON HIGHWAYS, EACH OF THE MOST RECENT DATE ADOPTED BY THE BOARD OF SUPERVISORS.
2. PRIOR TO CONSTRUCTION ON PROJECTS OTHER THAN TRACTS, DIVISIONS OF LAND, AND MINUTE ORDER PROJECTS, CONTRACTOR SHALL OBTAIN A PERMIT FROM THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY.
3. THE CONTRACTOR SHALL TELEPHONE THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY AT LEAST 24 HOURS PRIOR TO STARTING CONSTRUCTION.
4. ALL UNDERGROUND UTILITIES SHALL BE INSTALLED PRIOR TO SURFACING OF STREETS. THE INSTALLATION OF ALL UNDERGROUND FACILITIES CROSSING EXISTING ARTERIAL HIGHWAYS REQUIRES BORING OR JACKING, UNLESS OTHERWISE APPROVED BY THE ASSISTANT DIRECTOR, EMA DEVELOPMENT.
5. IN ACCORDANCE WITH ORANGE COUNTY ORDINANCE 6-3-27 THRU 6-3-80, ANY EXISTING PAVEMENT DISTURBED BY THE CONSTRUCTION OF UNDERGROUND INSTALLATIONS SHALL BE COVERED BY A PERMIT ISSUED BY THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY.
6. WHEREVER RELATIVE COMPACTION IS SPECIFIED TO BE DETERMINED BY TEST METHOD NO. CALIF. 216, THE RELATIVE COMPACTION WILL BE DETERMINED BY TEST METHOD NO. CALIF. 216 OR 231. THE AREA, AS STATED IN TEST METHOD NO. CALIF. 231, MAY BE REPRESENTED BY ONE OR MORE INDIVIDUAL TEST SITES.
7. LABORATORY MAXIMUM DENSITY TESTS SHALL BE PER METHOD 2 OF SECTION 211-2.1. THE CORRECTION FOR OVERSIZE MATERIAL AS STATED IN TEST METHOD NO. CALIF. 216 SHALL BE REPLACED WITH NOTE 2 OF A.S.T.M. D1557.
8. STRUCTURAL SECTION AND SUBGRADE COMPACTION REQUIREMENTS TO BE DETERMINED BY THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY'S MATERIALS ENGINEER.
9. IF DRIVEWAY DEPRESSIONS ARE MADE IN ANY CURB, DRIVEWAY APPROACHES ARE THEN CONSIDERED TO BE PART OF THE IMPROVEMENT PLAN AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY STANDARD PLAN NO. 209.
10. ALL LOT CORNERS SHALL BE SET IN ACCORDANCE WITH THE RECORDED TRACT MAP.
11. MONUMENTS ARE TO BE SET PER THE REQUIREMENTS OF THE OFFICE OF THE COUNTY SURVEYOR AND SUBDIVISION CODE AND LAND SURVEYORS ACT.
12. TREES SHALL NOT BE PLANTED IN ORANGE COUNTY RIGHT-OF-WAY UNLESS A PERMIT HAS BEEN OBTAINED FROM THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY.
13. ADVERTISING SIGNS WILL NOT BE PERMITTED WITHIN STREET RIGHT-OF-WAY PER ORANGE COUNTY CODIFIED ORDINANCE 6-1-69.
14. ENGINEER SHALL MEAN THE ASSISTANT DIRECTOR, EMA DEVELOPMENT OF ORANGE COUNTY, OR HIS AUTHORIZED AGENT ACTING WITHIN THE SCOPE OF HIS AUTHORITY, WHO SHALL ACT AS THE REPRESENTATIVE OF THE COUNTY DURING THE TERM OF THE CONTRACT.
15. MAILBOX INSTALLATION TO BE IN CONFORMANCE WITH O.C.E.M.A. STD. PLAN 211 or 212. LOCATION APPROVED BY LOCAL POSTMASTER.

WATER NOTES

1. THE WATER SYSTEM SHALL CONFORM TO THE MOULTON-NIGUEL WATER DISTRICT'S "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEM" AS LAST REVISED. THE CONTRACTOR SHALL HAVE A COPY OF THESE PLANS AND THE STANDARD SPECIFICATIONS ON THE JOB AT ALL TIMES.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CALL (714) 752-0505.
4. WATER MAINS SHALL BE INSTALLED 6 FEET OFF THE CURB FACE, UNLESS INDICATED OTHERWISE, AND PRIOR TO PAVING OF THE STREETS.
5. FIRE HYDRANTS AND BLOWOFFS SHALL BE INSTALLED PER MOULTON-NIGUEL WATER DISTRICT'S SPECIFICATIONS. FIRE HYDRANTS SHALL BE INSTALLED 24" FROM THE FACE OF THE CURB WHERE SIDEWALKS ARE NOT ADJACENT TO CURBS. WHERE SIDEWALKS ARE ADJACENT TO CURBS FIRE HYDRANTS SHALL BE PLACED BEHIND THE SIDEWALK PER DETAILS S-3 OF THE "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEMS." ALL HYDRANTS SHALL BE CENTERED IN A 3'-0" SQUARE, 4" THICK, CONCRETE PAD. WHERE FIRE HYDRANTS ARE REQUIRED AT STREET INTERSECTIONS, THE EDGE OF THE PAD SHALL BE SET AT THE B.C.R.
6. THE DEVELOPER SHALL FURNISH THE MOULTON-NIGUEL WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM OUTSIDE THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
7. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E C 244 AFTER INSTALLATION INCLUDING NUTS, BOLTS, AND FLANGES.
8. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE MOULTON-NIGUEL WATER DISTRICT.
9. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE MOULTON-NIGUEL WATER DISTRICT.
10. THE CONTRACTOR SHALL OBTAIN AN EXCAVATION PERMIT FROM THE ORANGE COUNTY ROAD DEPARTMENT PRIOR TO START OF CONSTRUCTION.
11. WATER HOUSE CONNECTION LATERALS SHALL BE INSTALLED TO THE PROPERTY LINE PRIOR TO PAVING OF THE STREETS.
12. ALL WATER SERVICES SHALL BE SINGLE SERVICES AND INSTALLED PER MOULTON-NIGUEL WATER DISTRICT STANDARD SPECIFICATIONS.
13. ALL LOTS BELOW EVEVATION 465 SHALL BE PROVIDED WITH APPROVED PRESSURE REGULATORS SET AT 80 PSI.
14. WATER LOW FLOW DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH MOULTON-NIGUEL WATER DISTRICT RESOLUTION. COPIES OF SAID RESOLUTION CAN BE OBTAINED FROM THE DISTRICT OFFICE.



VICINITY MAP
NO SCALE

LEGEND	
—○—	VCP SEWER MAIN AND MANHOLE
	STREET LIGHTS
	STREET NAME SIGN
—⊗—	BUTTERFLY VALVE
	FIRE HYDRANT ASSEMBLY

STREET NAME SIGNS

LOCATION	NAME	NAME
N.W. Cor.	CROWN VALLEY PKWY.	PLAYA BLANCA DR.
N.E. Cor.	SAN FELIPE DR.	PLAYA BLANCA DR.
N.E. Cor.	SAN FELIPE DR.	VALLARTA DR.
N.W. Cor.	MATZALAN DR.	VALLARTA DR.
N.E. Cor.	MATZALAN DR.	PLAYA BLANCA DR.

BASIS OF BEARINGS:
The Bearing of N.26°45'56" E. for the Center line of Crown Valley Parkway as shown on Tract No 9338 M.M. 390/27-29

BENCH MARK: 3-U-32-70
South along Crown Valley Parkway about 300' from the Intersection of Paseo Del Niguel, to the first Concrete Catch Basin; About 51 feet East of the Center of the Median of the Parkway, Set in the top of the Northwest Corner of a 3 by 8 Foot Concrete Catch Basin, 1 foot Higher than the Gutter. Elevation 357.902 - 1970 Adj.

DEVELOPER:
MAYER CONSTRUCTION
8121 E. FLORENCE AVE.
DOWNEY CALIF. 90240
TELE: (213) 927-3341

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

FIRE PROTECTION APPROVAL
R. H. Hennessey by [signature] — 1-31-78
COUNTY FIRE MARSHAL — DATE

U.P. 3919

REVISIONS

NO	DESCRIPTION	SHT.	APPROVED	DATE
4	ADD CONCRETE GUTTER	3,7,4	[signature]	8/26/80
3	AS-BUILT STREET LIGHTS - NO SITE [illegible] 11-6-80	6,7		
2	ADD LINE B-7 [illegible] SPECIAL M.H. DETAIL FOR NEW M.H. NO. 4-A	3		
1	Revised SD Line 1 Sta 7+76-8+10 & Line 2 Sta 6+30-6+82	4&5	[signature]	11-9-79

MOULTON NIGUEL WATER DISTRICT – IMPROVEMENT DIST. NO. I (WATER)
APPROVED Carlo H. Habash R.C.E. #21752 — 12/13/78 Date

MOULTON NIGUEL WATER DISTRICT – IMPROVEMENT DIST. NO. IA (SEWER)
APPROVED Carlo H. Habash R.C.E. #21752 — 12/13/78 Date

PREPARED UNDER THE SUPERVISION OF
DOUGLAS SNYDER R.C.E. 24068 — 10/10/78 DATE

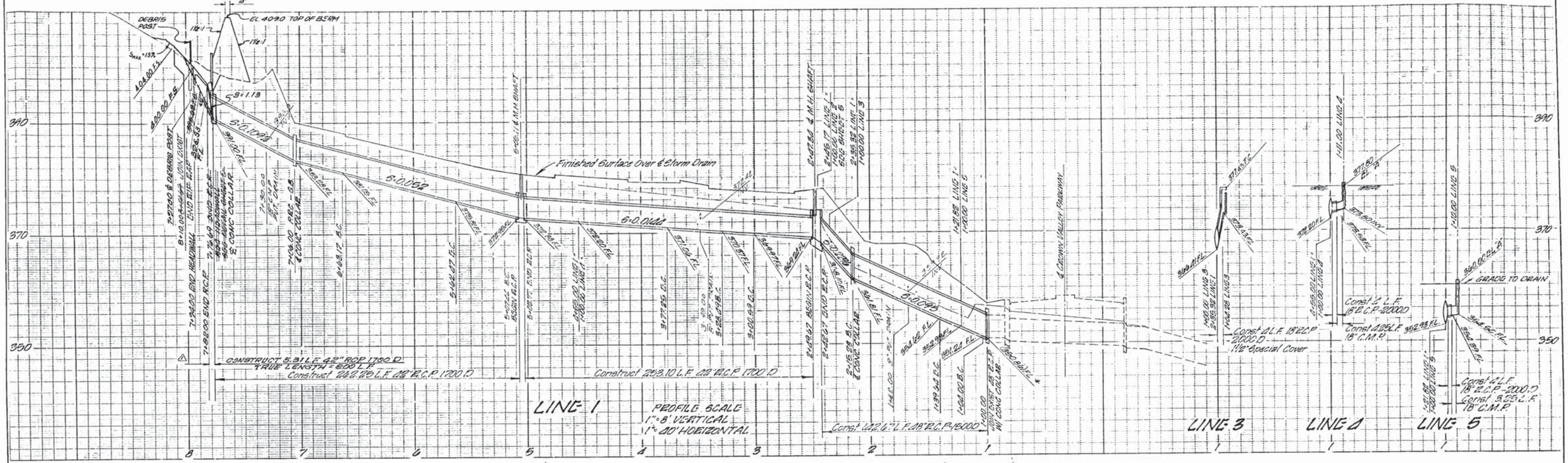
Hunsaker & Associates
Planning Engineering & Surveying
(714) 754-1011
9001 Red Hill Building VI Suite 212 Costa Mesa CA 92626

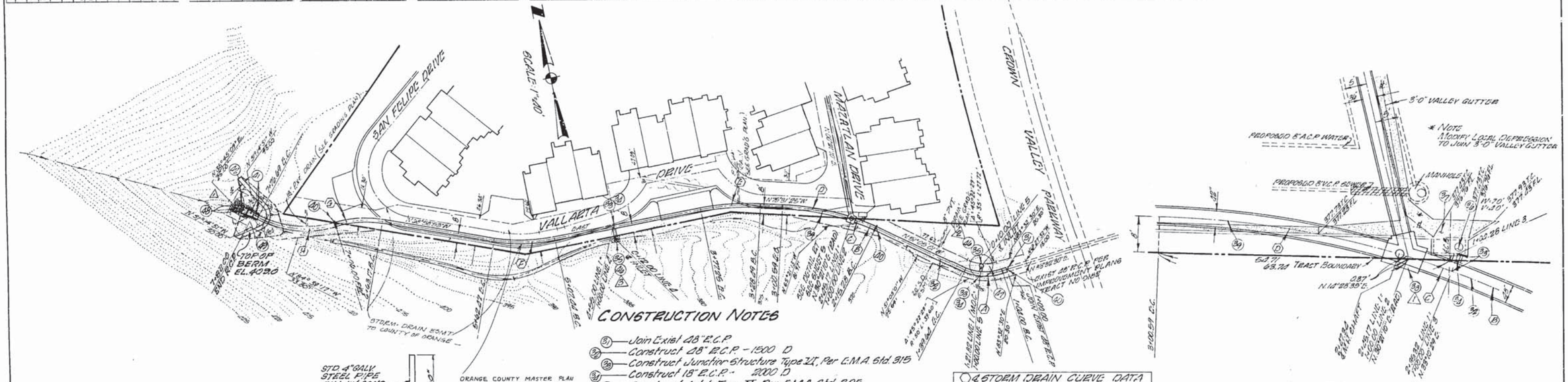
COUNTY OF ORANGE
E.M.A. DEVELOPMENT DIVISION
APPROVED
BY [signature] R.C.E. [illegible] — 1-4-79 DATE

IMPROVEMENT PLANS

TRACT 9650
U.P. 3919
TITLE SHEET
SHEET NO. 1 OF 9 SHEETS

Tr. Imp. 9650





CONSTRUCTION NOTES

(21) Join Exist 48" R.C.P.
(28) Construct 48" R.C.P. - 1500 D
(29) Construct Junction Structure Type VI, Per C.M.A. Std. 315
(31) Construct 18" R.C.P. - 2000 D
(32) Construct Inlet Type V Per C.M.A. Std. 305
(30) Construct Inlet Type II Per C.M.A. Std. 302
(37) Construct Local Depression Per C.M.A. Std. 308 (Modified)
(34) Construct Junction Structure Type III Per C.M.A. Std. 312
(35) Construct 42" R.C.P. - 1700 D
(36) Construct Concrete Collar Per O.C.E.M.A. Std. Plan 317
(27) Construct Inlet Headwall Structure Per Detail Sheet 5
(26) Construct Rip-Rap Per Detail Sheet 5
(25) Construct 18" C.M.P. - 12 Ga.
(41) Construct 10 Radius A.C. Apron
(43) Construct Debris Post Per Detail Hereon
(44) Construct Earth Berm

ORANGE COUNTY MASTER PLAN FACILITY Nº K01P11, SEE DWG. Nº K01P11-713-1.

STD 4" GALV. STEEL PIPE FILL W/ CONC.

DEBRIS POST

HYDRAULIC DATA LINE 1

STA. TO STA.	Q	S_O	N	D	D_N	V_N	D_C	V_C
1+00.00 To 1+81.82	262	0.005	0.013	48	1.90	31.33	3.85	16.27
1+21.82 To 2+45.28	197	0.005	0.013	48	1.88	33.05	3.84	15.90
2+45.28 To 2+35.32	197	0.2296	0.013	48	1.46	47.48	3.84	15.94
2+35.32 To 2+45.17	191	0.2296	0.013	48	1.44	47.15	3.82	15.53
2+45.17 To 4+55.00	143	0.0144	0.013	42	—	—	3.37	15.06
4+55.00 To 5+02.77	138	0.0144	0.013	42	—	—	3.35	14.67
5+02.77 To 7+06.00	138	0.0520	0.013	42	1.96	24.90	3.35	14.57
7+06.00 To 7+76.67	138	0.1092	0.013	42	1.58	32.87	3.35	14.57

○ STORM DRAIN CURVE DATA

NO.	Δ	R	L	T
A	25°28'24"	45.00	35.64	18.81
B	05°44'30"	200.00	20.04	10.03
C	08°29'19"	200.00	9.86	4.93
D	15°58'35"	200.00	55.48	27.89
E	14°28'35"	199.00	50.79	25.51
F	214°01'07"	150.00	55.03	27.83
G	27°16'58"	90.00	42.83	21.83
H	45°00'00"	90.00	70.69	37.28

△ STRUCTURE DATA

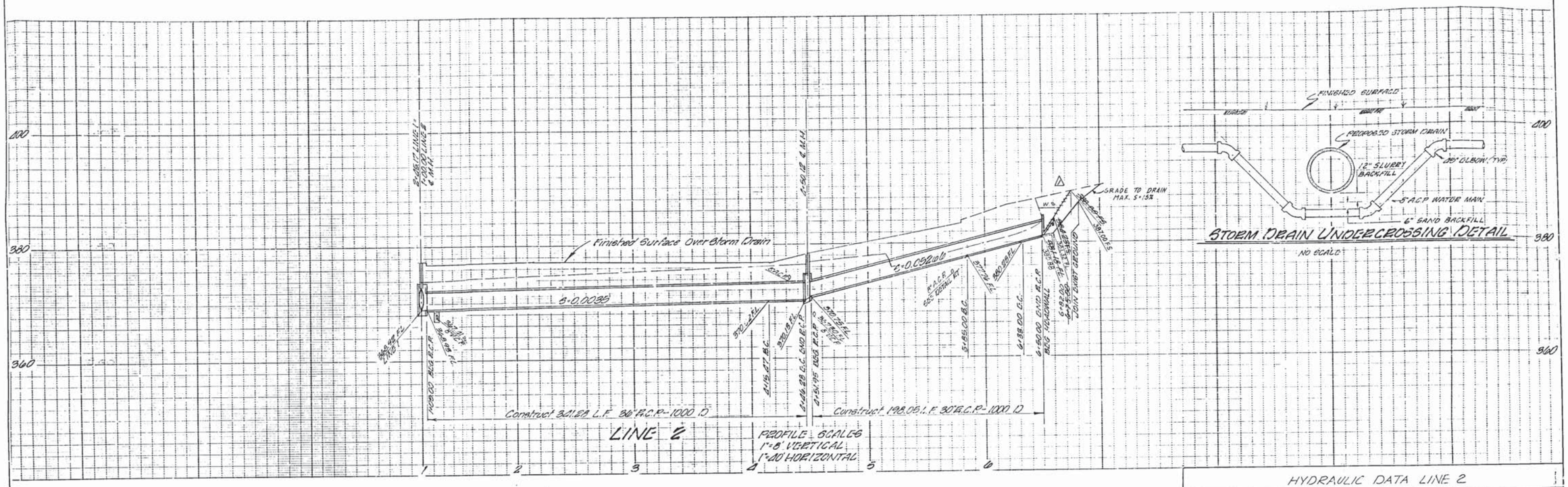
Type	No.	A	B	C	D	D_E	L_1	L_2
J.B. III	1	60"	36"	30"	42"	48"	—	—
Inlet "II"	2	3.300	—	—	15"	18"	3.29	2.0
Inlet "V"	3	3.7180	—	—	18"	18"	2.75	2.5

INTERSECTION DETAIL
SCALE: 1"=10'

UP 3919

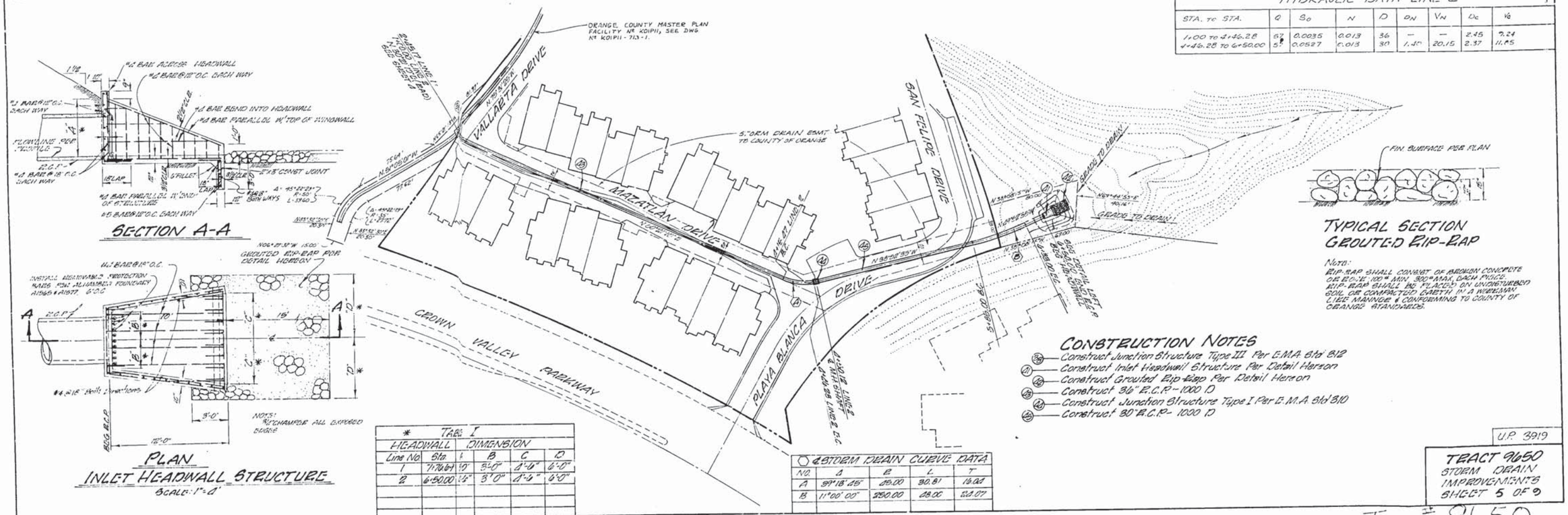
TRACT 9650
STORM DRAIN IMPROVEMENTS
SHEET 4 OF 9

TR IMP 9650



HYDRAULIC DATA LINE 2

STA. TO STA.	Q	S_o	N	D	DN	V_N	D_c	V_c
1+00 TO 4+46.28	57	0.0035	0.013	36	—	—	2.45	7.24
4+46.28 TO 6+50.00	57	0.0527	0.013	30	1.50	20.15	2.37	11.85



CONSTRUCTION NOTES

(3a) Construct Junction Structure Type III Per E.M.A. Std. 812
(21) Construct Inlet Headwall Structure Per Detail Hereon
(22) Construct Grouted Rip-Rap Per Detail Hereon
(23) Construct 36" R.C.P.- 1000 D
(24) Construct Junction Structure Type I Per E.M.A. Std. 810
(25) Construct 30" R.C.P.- 1000 D

* TABLE I					
HEADWALL DIMENSION					
Line No.	Sta.	L	B	C	D
1	1+76.64	10'	3'-0"	1'-0"	6'-0"
2	6+50.00	15'	3'-0"	1'-6"	6'-0"

○ STORM DRAIN CURVE DATA				
NO.	Δ	R	L	T
A	89°18'25"	20.00	30.81	19.66
B	11°00'00"	250.00	48.00	24.07

U.P. 3919

TRACT 9650
STORM DRAIN IMPROVEMENTS
SHEET 5 OF 9

TRIM# 9650