Appendix J Hydrology Report

Appendices

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HYDROLOGY ANALYSIS

FOR

TTM 18104

(NOHL CONDOS)

City of Anaheim

County of Orange

PREPARED FOR:

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PREPARED BY:

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APRIL 15, 2019

W.O. #4198-1

HYDROLOGY ANALYSIS

FOR

TTM 18104

(NOHL RANCH CONDOS)

City of Anaheim

County of Orange

PREPARED UNDER THE SUPERVISION OF:

TU TRINH, R.C.E. 71555 DATE: 4/15/19

TABLE OF CONTENTS

SECTION 1

INTRODUCTION

A. PROJECT LOCATION

The approximate 3.7 acre project site is an existing commercial center currently known as Serrano Center, and located on the northeast corner of Serrano Avenue and Nohl Ranch Road in the City of Anaheim (City). The site is bounded to the north and east by the existing single family residential tract 8375.

B. STUDY PURPOSE

The purpose of this hydrology study is to determine the flow rates produced from the project site in the existing and proposed conditions. It also serves as the basis for analyzing and designing the on-site storm drainage system to accommodate site runoff in the proposed condition and mitigate any potential impacts to adjacent property owners, including upstream/downstream drainages and storm drain facilities.

C. METHODOLOGY

The hydrology calculations were prepared using the Orange County Hydrology Manual as incorporated in the Advanced Engineering Software (AES) "RATSC" program. Soil type "D" is used for the hydrology calculations per the Hydrologic Classification of Soils map contained in the Orange County Hydrology Manual 1986.

D. DISCUSSION

Existing Condition

The existing site is commercial land use with 7 buildings and parking lots. The site is divided into two drainage areas "A" and "B" as shown on the hydrology map in Section 4 of this report. Runoff produced from drainage area "A" drains toward the east of Serrano Avenue and discharged into the existing storm drain system, plan numbers 9320 and 12250 in Section 5 of this report, located in Serrano Avenue, from Pegasus Street to S Calle Venado. Runoff produced from drainage area "B" drains toward the west of Serrano Avenue and discharged into the existing storm drain system, plan numbers 24723 and 24724 in Section 5 of this report, located at the intersection of Nohl Ranch Road and Serrano Avenue.

Proposed Condition

The City approved and adopted the City Master Plan of Drainage (MPD) for South & East Santa Ana River Tributary Area (District 39-3) on February 27, 2018. In the second review, the City requested Hunsaker & Associates, Inc. to refer to the MPD tributary area of sub-district 39-3. All of the hydrology and hydraulic matters that the City has concerned regarding re-routing, effects, and

mitigations as described in the third review should be found in Section 6 of the MPD. Refer to Section 5 of this report for Drainage District 39 discussion of MPD.

The proposed site will consist of the development of 8 residential condominium structures for 58 dwellings and supportive parking lots. Runoff produced from the developed site drains toward the east of Serrano Avenue and discharged into the existing storm drain system, plan numbers 9320 and 12250 in Serrano Avenue, as proposed in the MPD, Sub-District 39-3, Figure 6-1. Yard drains and area drains will be provided throughout the site and will be shown on the future precise grading plans.

Summary Table of drainage areas and flow rates in existing and proposed conditions

		Area "A"				Area "B"		
		Existing	**Proposed**	**Δ**		**Existing**	**Proposed**	**Δ**
Area (ac)		2.38	3.29	0.91		1.32	0.41	-0.91
Q2 (cfs)		3.2	4.2	1.0		2.5	0.8	-1.7
Q10 (cfs)		6.1	7.9	1.8		4.5	1.4	-3.1
Q25 (cfs)		7.3	9.6	2.3		5.4	1.7	-3.7
Q100 (cfs)		9.5	12.4	2.9		6.9	2.2	-4.7

Drainage area "A"

The designed storm for this project is 25-year. The total runoff produced from area "A" at node 6 is 9.6 cfs and discharged into a proposed public storm drain of 24" RCP in Serrano Avenue. The proposed public catch basin at node 6 will have connector pipe full capture screens and automatic retractable screens on the curb surface that meet the Full Capture Requirements of the State Trash Provisions.

A flow-by detention basin is proposed at node 4.1, with a required volume of 436 cuft, to mitigate the excess flow of 2.3cfs in the 25-year storm event. The location, type, and configuration of the proposed detention basin, diversion structure, and connector pipe will be determined in the final design.

Drainage area "B"

Storm runoff produced in all storm events in the proposed condition are reduced as shown in the Summary Table above. This proposed project improves the overall drainage condition in Area "B".

Notes:

1/. In the existing condition, the study is limited within the site boundary, not including the upstream area of Nohl Ranch Road. The same procedure applied to the proposed condition, the study is also limited within the site boundary, not including the upstream area of Nohl Ranch Road.

2/. For comparison with the existing condition we used the same acreage for the proposed condition, even though storm runoff produced from a portion of sub-area A5 does not drain to the proposed catch basin at node 6.

Conclusion

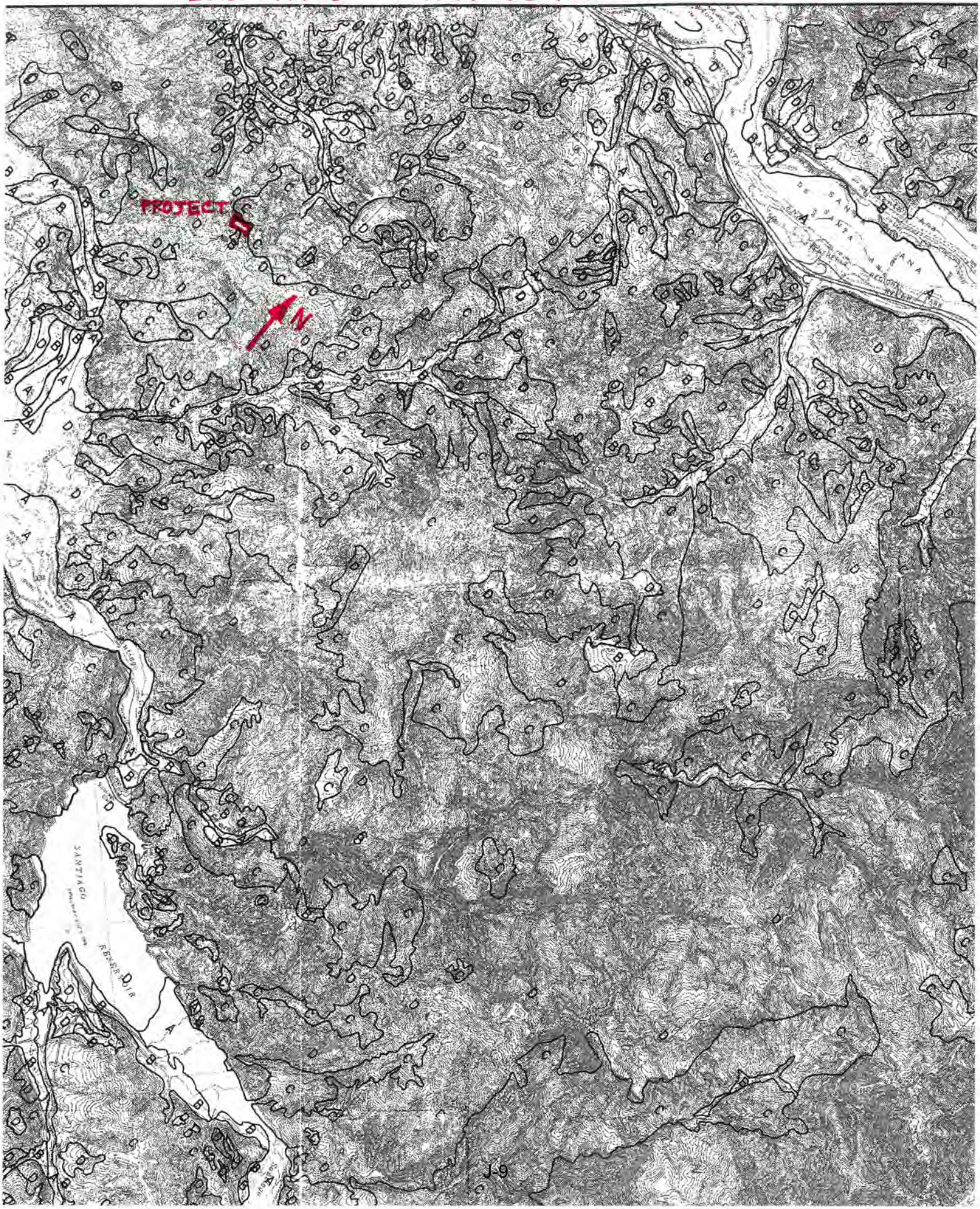
The proposed residential project, Nohl Ranch Condos, was designed in accordance with the City MPD as requested. It is anticipated that this project will not impact or cause significant change to the existing MPD as adopted and that long term mitigation plans as part of the MPD will be implemented and are able to accept the proposed drainage from this project site. Further construction analysis will occur at time of precise grading plan submittal and Final Hydrology.

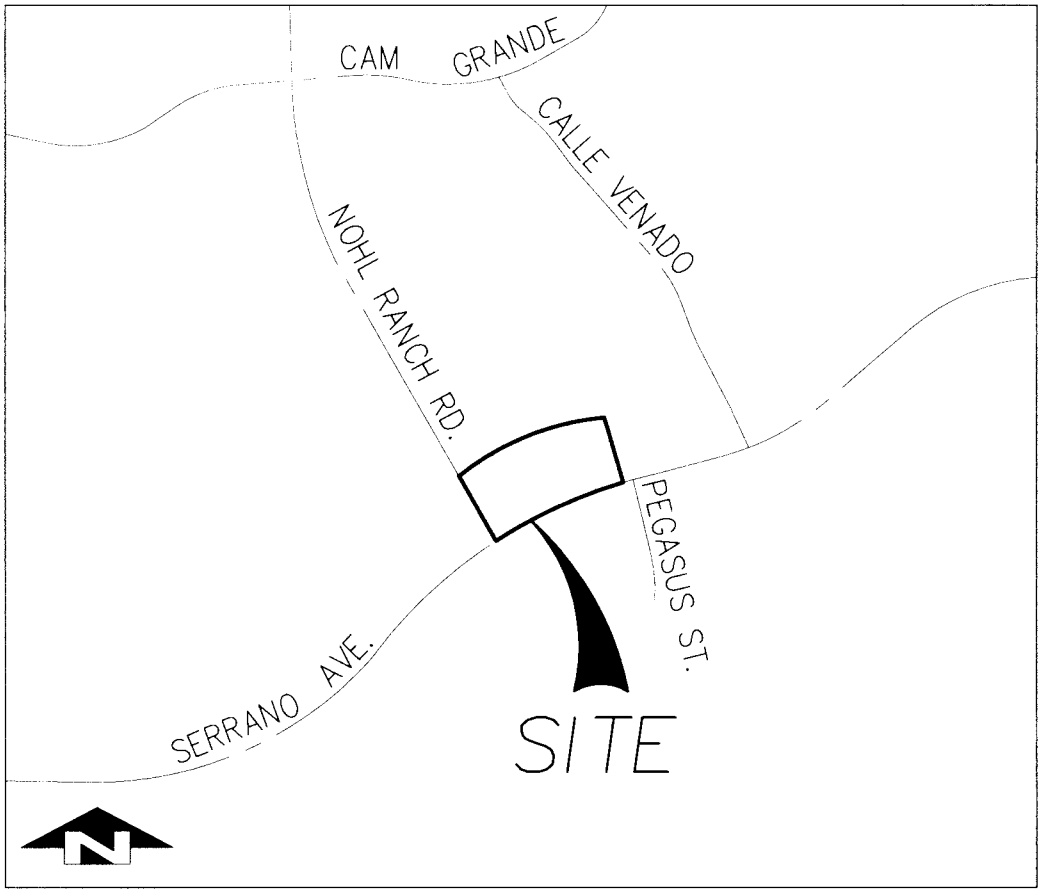
Per City direction, the Hydrology routing was changed in November 2018 based on the requirement to comply with City MPD as requested by City of Anaheim staff. The rerouting of the onsite drainage areas were altered to follow the design direction and the already approved MPD. The changes identified in the Summary Table above. Discussion of this hydrology analysis illustrate the revisions. Area "B" drainage in proposed Q25 condition is reduced by 3.7cfs while Area "A" drainage in proposed Q25 increased by 2.3cfs and this excess flow will be detained in a proposed flow-by detention basin. Grades were adjusted to reduce potential flooding to garages.

A flooding exhibit is also included in Section 4 of this report to indicate that all habitable finished floors have at least 1 foot above the 100-yr flood level. The TTM is updated to have the front edge elevation of the lowest garage finished floor at 860.31, which is higher than the overflow elevation. The garage floor is then sloped up from the garage edge at a rate of 1%. The exhibit illustrates that water does not enter the garage.

For Water Quality issue, please see the WQMP report.

SOIL TYPE D PER OCHM 1986_SOIL_PLATE B





VICINITY MAP

SECTION 2

HYDROLOGY CALCULATIONS
EXISTING CONDITION

```
**************************************************************************
            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 *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 2-YR STUDY                                                            *
* EXISTING CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-E.DAT
  TIME/DATE OF STUDY: 09:21 08/02/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE       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) =   231.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.564
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.129
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.40      0.20      0.100    57    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.76

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    858.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.565
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        1.65      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.35
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   3.95
  Tc(MIN.) =    9.52
  SUBAREA AREA(ACRES) =     1.65     SUBAREA RUNOFF(CFS) =    2.29
  EFFECTIVE AREA(ACRES) =     2.05     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      2.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   2.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     788.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  858.00  DOWNSTREAM ELEVATION(FEET) =  857.00
  STREET LENGTH(FEET) =    58.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 31.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  26.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.07
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =    9.24
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.95
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
 STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =    9.84
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.33      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.33      SUBAREA RUNOFF(CFS) =     0.45
 EFFECTIVE AREA(ACRES) =      2.38    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       3.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =   9.44
 FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     846.00 FEET.

****************************************************************************
 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) =   262.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.136
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        0.44      0.20      0.100    57    5.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.84
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.53
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.88      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.88      SUBAREA RUNOFF(CFS) =     1.68
 EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       2.51
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        1.3  TC(MIN.) =      5.53
 EFFECTIVE AREA(ACRES) =      1.32  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS)    =       2.51
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            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 *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 10-YR STUDY                                                           *
* EXISTING CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-E.DAT
  TIME/DATE OF STUDY: 14:10 07/31/2017
========================================================================
  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 = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE      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) =   231.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.564
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.818
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.40      0.20      0.100    75    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.37
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.37

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    858.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.901
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.65      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.71
  AVERAGE FLOW DEPTH(FEET) =   0.66   TRAVEL TIME(MIN.) =   3.43
  Tc(MIN.) =    8.99
  SUBAREA AREA(ACRES) =     1.65     SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =     2.05    AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      5.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   3.02
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     788.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  858.00  DOWNSTREAM ELEVATION(FEET) =  857.00
  STREET LENGTH(FEET) =    58.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 31.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  26.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   12.24
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =    9.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.33      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) =     0.33      SUBAREA RUNOFF(CFS) =     0.84
  EFFECTIVE AREA(ACRES) =      2.38    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =        6.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  12.54
  FLOW VELOCITY(FEET/SEC.) =  3.44   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     846.00 FEET.

****************************************************************************
  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) =   262.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.830
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.44      0.20      0.100    75    5.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.51
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.51

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.53
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.830
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.88      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) =     0.88      SUBAREA RUNOFF(CFS) =     3.02
  EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =        4.53
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        1.3  TC(MIN.) =      5.53
  EFFECTIVE AREA(ACRES) =      1.32  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)    =       4.53
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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

 ************************* DESCRIPTION OF STUDY *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 25-YR STUDY                                                           *
* EXISTING CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-E.DAT
  TIME/DATE OF STUDY: 14:12 07/31/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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) =   231.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.564
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.540
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.40      0.20      0.100    75    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.63
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.63

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    858.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.496
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.65      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.84
  AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   3.27
  Tc(MIN.) =    8.83
  SUBAREA AREA(ACRES) =     1.65      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =      2.05     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       2.0        PEAK FLOW RATE(CFS) =      6.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.82   FLOW VELOCITY(FEET/SEC.) =   3.17
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     788.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  858.00  DOWNSTREAM ELEVATION(FEET) =  857.00
  STREET LENGTH(FEET) =    58.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 31.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  26.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.92
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   13.30
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.53
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.50
 STREET FLOW TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =    9.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.436
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.33      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) =    0.33      SUBAREA RUNOFF(CFS) =    1.01
 EFFECTIVE AREA(ACRES) =      2.38    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       7.32

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  13.61
 FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.54
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     846.00 FEET.

****************************************************************************
 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) =   262.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.555
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 D        0.44      0.20      0.100    75    5.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.80
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.80

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.53
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.555
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.88      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) =    0.88      SUBAREA RUNOFF(CFS) =    3.59
 EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       5.39
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        1.3  TC(MIN.) =      5.53
 EFFECTIVE AREA(ACRES) =      1.32  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS)    =       5.39
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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

 ************************* DESCRIPTION OF STUDY *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 100-YR STUDY                                                          *
* EXISTING CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-E.DAT
  TIME/DATE OF STUDY: 14:13 07/31/2017
========================================================================
  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 = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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) =   231.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.564
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.820
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.40      0.20      0.100    91    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.09
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      2.09

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    858.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   557.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.530
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.65      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.04
  AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   3.05
  Tc(MIN.) =    8.61
  SUBAREA AREA(ACRES) =     1.65     SUBAREA RUNOFF(CFS) =    6.70
  EFFECTIVE AREA(ACRES) =     2.05     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      8.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.91   FLOW VELOCITY(FEET/SEC.) =   3.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     788.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  858.00  DOWNSTREAM ELEVATION(FEET) =  857.00
  STREET LENGTH(FEET) =    58.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 31.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  26.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.98
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   14.83
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.76
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.71
 STREET FLOW TRAVEL TIME(MIN.) =   0.26   Tc(MIN.) =    8.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.455
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.33      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) =     0.33      SUBAREA RUNOFF(CFS) =    1.32
 EFFECTIVE AREA(ACRES) =      2.38    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       9.50

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  15.18
 FLOW VELOCITY(FEET/SEC.) =  3.81   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     846.00 FEET.

****************************************************************************
 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) =   262.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.838
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        0.44      0.20      0.100    91    5.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.30
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      2.30

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.53
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.838
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.88      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) =     0.88      SUBAREA RUNOFF(CFS) =    4.61
 EFFECTIVE AREA(ACRES) =      1.32   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       6.91
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        1.3  TC(MIN.) =      5.53
 EFFECTIVE AREA(ACRES) =      1.32  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS)    =       6.91
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

SECTION 3

HYDROLOGY CALCULATIONS
PROPOSED CONDITION

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

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

 ************************* DESCRIPTION OF STUDY *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 2-YR STUDY                                                            *
* PROPOSED CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-P.DAT
  TIME/DATE OF STUDY: 11:09 11/27/2018
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      1.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  ELEVATION DATA: UPSTREAM(FEET) =    861.42  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.568
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.784
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS              D        0.52      0.20      0.350    57    7.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.52   PEAK FLOW RATE(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   859.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.80
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    8.34
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE      2.00 =     307.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.34
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.688
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS              D        0.79      0.20      0.350    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    1.15
  EFFECTIVE AREA(ACRES) =      1.31   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       1.91

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.30  DOWNSTREAM(FEET) =   859.20
  FLOW LENGTH(FEET) =    20.00   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.) =   3.38
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.91
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.44
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      3.00 =     327.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.44
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.676
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.64      0.20      0.350    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.93
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       2.82

****************************************************************************
 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) =   859.20  DOWNSTREAM(FEET) =   858.20
 FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.45
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.82
 PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =    9.67
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      4.00 =     582.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.67
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.550
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.89      0.20      0.350    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     1.19
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       3.78

****************************************************************************
 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) =   858.20  DOWNSTREAM(FEET) =   857.80
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.78
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   10.06
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      5.00 =     672.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.06
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.516
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.14      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.14      SUBAREA RUNOFF(CFS) =     0.19
 EFFECTIVE AREA(ACRES) =      2.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       3.88

****************************************************************************
 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) =   857.80  DOWNSTREAM(FEET) =   857.30
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.88
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   10.31
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      6.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.494
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.31      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.31      SUBAREA RUNOFF(CFS) =     0.41
  EFFECTIVE AREA(ACRES) =      3.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       4.24

********************************************************************************
  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) =   262.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.136
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  D        0.41      0.20      0.100    57    5.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      0.78
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        0.4  TC(MIN.) =      5.53
  EFFECTIVE AREA(ACRES) =      0.41  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)    =       0.78
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
           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 *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 10-YR STUDY                                                           *
* PROPOSED CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-P.DAT
  TIME/DATE OF STUDY: 11:10 11/27/2018
========================================================================
  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 = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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      0.00 TO NODE      1.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  ELEVATION DATA: UPSTREAM(FEET) =    861.42  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.568
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.201
  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.)
  CONDOMINIUMS              D        0.52      0.20      0.350    75    7.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      1.47
  TOTAL AREA(ACRES) =      0.52   PEAK FLOW RATE(CFS) =      1.47

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   859.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.26
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.47
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =    8.22
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE      2.00 =     307.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    8.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.054
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS              D        0.79      0.20      0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      1.31   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.52

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.30  DOWNSTREAM(FEET) =   859.20
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.99
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.52
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.30
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      3.00 =     327.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.30
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.036
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 CONDOMINIUMS               D        0.64      0.20      0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.71
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       5.21

****************************************************************************
 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) =   859.20  DOWNSTREAM(FEET) =   858.20
 FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.21
 PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =    9.38
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      4.00 =     582.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.38
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.831
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 CONDOMINIUMS               D        0.89      0.20      0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.21
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.06

****************************************************************************
 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) =   858.20  DOWNSTREAM(FEET) =   857.80
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.51
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.06
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    9.71
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      5.00 =     672.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.775
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 COMMERCIAL                 D        0.14      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.35
 EFFECTIVE AREA(ACRES) =      2.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       7.26

****************************************************************************
 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) =   857.80  DOWNSTREAM(FEET) =   857.30
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.26
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    9.93
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      6.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.93
```

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.740
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.31      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) =     0.31      SUBAREA RUNOFF(CFS) =     0.76
 EFFECTIVE AREA(ACRES) =      3.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       7.93

****************************************************************************
 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) =   262.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.830
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        0.41      0.20      0.100    75    5.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.41
 TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      1.41
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        0.4  TC(MIN.) =      5.53
 EFFECTIVE AREA(ACRES) =      0.41  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS)   =       1.41
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 25-YR STUDY                                                           *
* PROPOSED CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-P.DAT
  TIME/DATE OF STUDY: 11:12 11/27/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========== ================== ======  ===== ====== ===== =======
  1   30.0      20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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      0.00 TO NODE      1.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  ELEVATION DATA: UPSTREAM(FEET) =    861.42  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.568
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.815
  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.)
  CONDOMINIUMS               D        0.52      0.20      0.350    75    7.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      1.75
  TOTAL AREA(ACRES) =      0.52   PEAK FLOW RATE(CFS) =      1.75

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   859.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.75
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE      2.00 =     307.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    8.19
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.649
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        0.79      0.20      0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.54
  EFFECTIVE AREA(ACRES) =      1.31   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       4.22

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.30  DOWNSTREAM(FEET) =   859.20
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.22
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.27
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      3.00 =     327.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.27
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.629
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.64      0.20      0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.05
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       6.25

****************************************************************************
 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) =   859.20  DOWNSTREAM(FEET) =   858.20
 FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.19
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.25
 PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    9.28
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      4.00 =     582.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.28
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.399
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.89      0.20      0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       8.51

****************************************************************************
 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) =   858.20  DOWNSTREAM(FEET) =   857.80
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.68
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.51
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    9.60
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      5.00 =     672.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.60
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.334
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.14      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.42
 EFFECTIVE AREA(ACRES) =      2.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       8.76

****************************************************************************
 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) =   857.80  DOWNSTREAM(FEET) =   857.30
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.76
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.81
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      6.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.81
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.294
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.31      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) =     0.31      SUBAREA RUNOFF(CFS) =     0.91
 EFFECTIVE AREA(ACRES) =      3.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =         3.3       PEAK FLOW RATE(CFS) =       9.57

****************************************************************************
 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) =   262.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.555
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        0.41      0.20      0.100    75    5.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.67
 TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      1.67
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        0.4  TC(MIN.) =      5.53
 EFFECTIVE AREA(ACRES) =      0.41  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS)    =       1.67
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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

 ************************* DESCRIPTION OF STUDY *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 100-YR STUDY                                                          *
* PROPOSED CONDITION                                                    *
 ************************************************************************

  FILE NAME: NOHL-P.DAT
  TIME/DATE OF STUDY: 11:13 11/27/2018
========================================================================
  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 = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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      0.00 TO NODE      1.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  ELEVATION DATA: UPSTREAM(FEET) =    861.42  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.568
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.879
  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.)
  CONDOMINIUMS              D        0.52      0.20      0.350    91    7.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      2.25
  TOTAL AREA(ACRES) =      0.52   PEAK FLOW RATE(CFS) =      2.25

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   859.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.25
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    8.14
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE      2.00 =     307.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    8.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.678
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS              D        0.79      0.20      0.350    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    3.28
  EFFECTIVE AREA(ACRES) =      1.31   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       5.43

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.30  DOWNSTREAM(FEET) =   859.20
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.43
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.22
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      3.00 =     327.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.654
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.64      0.20      0.350    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.64
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       8.04

****************************************************************************
 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) =   859.20  DOWNSTREAM(FEET) =   858.20
 FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.04
 PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =    9.19
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      4.00 =     582.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.366
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.89      0.20      0.350    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    3.44
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =      10.98

****************************************************************************
 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) =   858.20  DOWNSTREAM(FEET) =   857.80
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.02
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.98
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    9.49
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      5.00 =     672.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.287
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.14      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.54
 EFFECTIVE AREA(ACRES) =      2.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =      11.32

****************************************************************************
 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) =   857.80  DOWNSTREAM(FEET) =   857.30
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.32
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.68
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      6.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.68
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.237
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.31      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) =     0.31      SUBAREA RUNOFF(CFS) =     1.18
  EFFECTIVE AREA(ACRES) =      3.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =      12.36

****************************************************************************
  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) =   262.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.838
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.41      0.20      0.100    91    5.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.15
  TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      2.15
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        0.4  TC(MIN.) =      5.53
  EFFECTIVE AREA(ACRES) =      0.41  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)    =       2.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
*******************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                   AND LOW LOSS FRACTION ESTIMATIONS
===============================================================================
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                            Analysis prepared by:

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

*******************************************************************************
-------------------------------------------------------------------------------

 Problem Descriptions:
  W.O. #4198-1, NOHL CONDOS
  25-YR STUDY
  PROPOSED CONDITION
===============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

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

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA    NUMBER    Fp(in./hr.)    YIELD
         1         3.29       30.00           75.       0.200        0.800

    TOTAL AREA (Acres) =      3.29

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.060

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.200
===============================================================================
```

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

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                        Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
* W.O. #4198-1, NOHL CONDOS                                             *
* 25-YR STUDY                                                           *
* PROPOSED FLOW-BY BASIN                                                *
 ************************************************************************

  FILE NAME: NOHL.DAT
  TIME/DATE OF STUDY: 16:01 04/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    3.29
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.060
    LOW LOSS FRACTION = 0.200
    TIME OF CONCENTRATION(MIN.) =  9.70
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.93
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.30

--------------------------------------------------------------------------
```

2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.4	4.8	7.2	9.6
14.000	0.3250	0.71	. Q	. V	.	.	.
14.017	0.3260	0.72	. Q	. V	.	.	.
14.033	0.3270	0.72	. Q	. V	.	.	.
14.050	0.3280	0.72	. Q	. V	.	.	.
14.067	0.3290	0.72	. Q	. V	.	.	.
14.083	0.3300	0.73	. Q	. V	.	.	.
14.100	0.3310	0.73	. Q	. V	.	.	.
14.117	0.3320	0.73	. Q	. V	.	.	.
14.133	0.3330	0.74	. Q	. V	.	.	.
14.150	0.3341	0.74	. Q	. V	.	.	.
14.167	0.3351	0.75	. Q	. V	.	.	.
14.183	0.3361	0.75	. Q	. V	.	.	.
14.200	0.3372	0.75	. Q	. V	.	.	.
14.217	0.3382	0.76	. Q	. V	.	.	.
14.233	0.3393	0.76	. Q	. V	.	.	.
14.250	0.3403	0.77	. Q	. V	.	.	.
14.267	0.3414	0.77	. Q	. V	.	.	.
14.283	0.3424	0.77	. Q	. V	.	.	.
14.300	0.3435	0.78	. Q	. V	.	.	.
14.317	0.3446	0.78	. Q	. V	.	.	.
14.333	0.3456	0.78	. Q	. V	.	.	.
14.350	0.3467	0.78	. Q	. V	.	.	.
14.367	0.3478	0.79	. Q	. V	.	.	.
14.383	0.3489	0.79	. Q	. V	.	.	.
14.400	0.3500	0.80	. Q	. V	.	.	.
14.417	0.3511	0.80	. Q	. V	.	.	.
14.433	0.3522	0.81	. Q	. V	.	.	.
14.450	0.3533	0.82	. Q	. V	.	.	.
14.467	0.3545	0.82	. Q	. V	.	.	.
14.483	0.3556	0.83	. Q	. V	.	.	.
14.500	0.3568	0.84	. Q	. V	.	.	.
14.517	0.3579	0.84	. Q	. V	.	.	.
14.533	0.3591	0.85	. Q	. V	.	.	.
14.550	0.3603	0.86	. Q	. V	.	.	.
14.567	0.3615	0.86	. Q	. V	.	.	.
14.583	0.3627	0.87	. Q	. V	.	.	.
14.600	0.3639	0.87	. Q	. V	.	.	.
14.617	0.3651	0.88	. Q	. V	.	.	.
14.633	0.3663	0.88	. Q	. V	.	.	.
14.650	0.3675	0.88	. Q	. V	.	.	.
14.667	0.3687	0.89	. Q	. V	.	.	.
14.683	0.3700	0.89	. Q	. V	.	.	.
14.700	0.3712	0.90	. Q	. V	.	.	.
14.717	0.3724	0.90	. Q	. V	.	.	.
14.733	0.3737	0.91	. Q	. V	.	.	.
14.750	0.3750	0.92	. Q	. V	.	.	.
14.767	0.3762	0.93	. Q	. V	.	.	.
14.783	0.3775	0.94	. Q	. V	.	.	.
14.800	0.3788	0.95	. Q	. V	.	.	.
14.817	0.3802	0.96	. Q	. V	.	.	.
14.833	0.3815	0.97	. Q	. V	.	.	.
14.850	0.3828	0.98	. Q	. V	.	.	.
14.867	0.3842	0.99	. Q	. V	.	.	.
14.883	0.3856	1.00	. Q	. V	.	.	.
14.900	0.3869	1.00	. Q	. V	.	.	.
14.917	0.3883	1.01	. Q	. V	.	.	.
14.933	0.3897	1.01	. Q	. V	.	.	.
14.950	0.3911	1.02	. Q	. V	.	.	.
14.967	0.3925	1.03	. Q	. V	.	.	.
14.983	0.3940	1.03	. Q	. V	.	.	.
15.000	0.3954	1.04	. Q	. V	.	.	.
15.017	0.3968	1.04	. Q	. V	.	.	.
15.033	0.3983	1.05	. Q	. V	.	.	.
15.050	0.3997	1.06	. Q	. V	.	.	.
15.067	0.4012	1.08	. Q	. V	.	.	.
15.083	0.4027	1.09	. Q	. V	.	.	.
15.100	0.4043	1.11	. Q	. V	.	.	.
15.117	0.4058	1.12	. Q	. V	.	.	.
15.133	0.4074	1.14	. Q	. V	.	.	.
15.150	0.4089	1.15	. Q	. V	.	.	.
15.167	0.4105	1.17	. Q	. V	.	.	.
15.183	0.4122	1.18	. Q	. V	.	.	.
15.200	0.4138	1.19	. Q	. V	.	.	.
15.217	0.4155	1.20	. Q	. V	.	.	.
15.233	0.4172	1.21	. Q	. V	.	.	.
15.250	0.4188	1.22	. Q	. V	.	.	.
15.267	0.4205	1.23	. Q	. V	.	.	.
15.283	0.4223	1.24	. Q	. V	.	.	.
15.300	0.4240	1.25	. Q	. V	.	.	.
15.317	0.4257	1.26	. Q	. V	.	.	.
15.333	0.4275	1.27	. Q	. V	.	.	.
15.350	0.4292	1.28	. Q	. V	.	.	.
15.367	0.4310	1.29	. Q	. V	.	.	.
15.383	0.4328	1.29	. Q	. V	.	.	.
15.400	0.4346	1.29	. Q	. V	.	.	.
15.417	0.4363	1.29	. Q	. V	.	.	.
15.433	0.4381	1.29	. Q	. V	.	.	.
15.450	0.4399	1.29	. Q	. V	.	.	.
15.467	0.4417	1.29	. Q	. V	.	.	.
15.483	0.4435	1.29	. Q	. V	.	.	.
15.500	0.4452	1.29	. Q	. V	.	.	.
15.517	0.4470	1.29	. Q	. V	.	.	.
15.533	0.4488	1.31	. Q	. V	.	.	.
15.550	0.4506	1.33	. Q	. V	.	.	.
15.567	0.4525	1.35	. Q	. V	.	.	.
15.583	0.4544	1.36	. Q	. V	.	.	.
15.600	0.4563	1.38	. Q	. V	.	.	.
15.617	0.4582	1.40	. Q	. V	.	.	.
15.633	0.4602	1.42	. Q	. V	.	.	.

15.650	0.4622	1.44	. Q . V. . .
15.667	0.4642	1.46	. Q . V. . .
15.683	0.4662	1.49	. Q . V . .
15.700	0.4684	1.56	. Q . V . .
15.717	0.4707	1.65	. Q . V . .
15.733	0.4731	1.74	. Q . V . .
15.750	0.4756	1.83	. Q . V . .
15.767	0.4782	1.93	. Q . V . .
15.783	0.4810	2.02	. Q . V . .
15.800	0.4839	2.11	. Q . V . .
15.817	0.4869	2.20	. Q. V . .
15.833	0.4901	2.29	. Q. .V . .
15.850	0.4934	2.38	. Q. .V . .
15.867	0.4968	2.47	. Q .V . .
15.883	0.5003	2.56	. Q .V . .
15.900	0.5039	2.65	. .Q .V . .
15.917	0.5077	2.74	. .Q .V . .
15.933	0.5116	2.83	. .Q .V . .
15.950	0.5157	2.93	. . Q . V . .
15.967	0.5198	3.02	. . Q . V . .
15.983	0.5241	3.11	. . Q . V . .
16.000	0.5285	3.20	. . Q . V . .
16.017	0.5334	3.57	. . Q . V . .
16.033	0.5392	4.23	. . Q . V . .
16.050	0.5460	4.88	. . Q V . .
16.067	0.5536	5.53	. . . Q . .
16.083	0.5621	6.19	. . . VQ . .
16.100	0.5715	6.84	. . . V Q . .
16.117	0.5819	7.50	. . . V .Q . .
16.133	0.5931	8.15	. . . V . Q . .
16.150	0.6052	8.80	. . . V . Q . .
16.167	0.6184	9.59	. . . V . Q . .
16.183	0.6307	8.94	. . . V . Q . .
16.200	0.6420	8.14	. . . V . Q . .
16.217	0.6520	7.33	. . . V Q . .
16.233	0.6610	6.53	. . . QV . . .
16.250	0.6689	5.72	. . . Q V . . .
16.267	0.6757	4.91	. . Q V. . .
16.283	0.6813	4.11	. . Q . V. . .
16.300	0.6859	3.30	. . Q . V. . .
16.317	0.6893	2.50	. Q . V. . .
16.333	0.6918	1.83	. Q . V. . .
16.350	0.6942	1.72	. Q . V. . .
16.367	0.6965	1.68	. Q . V. . .
16.383	0.6988	1.64	. Q . V . .
16.400	0.7010	1.60	. Q . V . .
16.417	0.7031	1.55	. Q . V . .
16.433	0.7052	1.51	. Q . V . .
16.450	0.7072	1.47	. Q . V . .
16.467	0.7092	1.42	. Q . V . .
16.483	0.7111	1.38	. Q . V . .
16.500	0.7129	1.35	. Q . V . .
16.517	0.7148	1.32	. Q . V . .
16.533	0.7165	1.30	. Q . V . .
16.550	0.7183	1.27	. Q . V . .
16.567	0.7200	1.25	. Q . V . .
16.583	0.7217	1.22	. Q . V . .
16.600	0.7234	1.20	. Q . .V . .
16.617	0.7250	1.17	. Q . .V . .
16.633	0.7266	1.15	. Q . .V . .
16.650	0.7281	1.12	. Q . .V . .
16.667	0.7296	1.10	. Q . .V . .
16.683	0.7311	1.09	. Q . .V . .
16.700	0.7326	1.07	. Q . .V . .
16.717	0.7340	1.05	. Q . .V . .
16.733	0.7355	1.03	. Q . .V . .
16.750	0.7369	1.02	. Q . .V . .
16.767	0.7382	1.00	. Q . .V . .
16.783	0.7396	0.98	. Q . .V . .
16.800	0.7409	0.96	. Q . .V . .
16.817	0.7422	0.94	. Q . .V . .
16.833	0.7435	0.93	. Q . .V . .
16.850	0.7448	0.92	. Q . .V . .
16.867	0.7460	0.91	. Q . . V . .
16.883	0.7472	0.89	. Q . . V . .
16.900	0.7485	0.88	. Q . . V . .
16.917	0.7497	0.87	. Q . . V . .
16.933	0.7508	0.86	. Q . . V . .
16.950	0.7520	0.85	. Q . . V . .
16.967	0.7531	0.83	. Q . . V . .
16.983	0.7543	0.82	. Q . . V . .
17.000	0.7554	0.81	. Q . . V . .
17.017	0.7565	0.80	. Q . . V . .
17.033	0.7576	0.80	. Q . . V . .
17.050	0.7587	0.79	. Q . . V . .
17.067	0.7598	0.78	. Q . . V . .
17.083	0.7608	0.77	. Q . . V . .
17.100	0.7619	0.76	. Q . . V . .
17.117	0.7629	0.75	. Q . . V . .
17.133	0.7639	0.74	. Q . . V . .
17.150	0.7649	0.74	. Q . . V . .
17.167	0.7659	0.73	. Q . . V . .
17.183	0.7669	0.73	. Q . . V . .
17.200	0.7679	0.72	. Q . . V . .
17.217	0.7689	0.71	. Q . . V . .
17.233	0.7699	0.71	. Q . . V . .
17.250	0.7709	0.70	. Q . . V . .
17.267	0.7718	0.70	. Q . . V . .
17.283	0.7728	0.69	. Q . . V . .
17.300	0.7737	0.69	. Q . . V . .
17.317	0.7747	0.68	. Q . . V . .
17.333	0.7756	0.68	. Q . . V . .
17.350	0.7765	0.67	. Q . . V . .
17.367	0.7774	0.67	. Q . . V . .
17.383	0.7783	0.66	. Q . . V . .
17.400	0.7792	0.66	. Q . . V . .
17.417	0.7801	0.65	. Q . . V . .
17.433	0.7810	0.65	. Q . . V . .
17.450	0.7819	0.64	. Q . . V . .
17.467	0.7828	0.64	. Q . . V . .
17.483	0.7837	0.64	. Q . . V . .
17.500	0.7846	0.63	. Q . . V . .

17.517	0.7854	0.63	. Q	.	.	.	V	.
17.533	0.7863	0.62	. Q	.	.	.	V	.
17.550	0.7871	0.62	. Q	.	.	.	V	.
17.567	0.7880	0.62	. Q	.	.	.	V	.
17.583	0.7888	0.61	. Q	.	.	.	V	.
17.600	0.7897	0.61	. Q	.	.	.	V	.
17.617	0.7905	0.60	. Q	.	.	.	V	.
17.633	0.7913	0.60	. Q	.	.	.	V	.
17.650	0.7921	0.60	. Q	.	.	.	V	.
17.667	0.7930	0.59	. Q	.	.	.	V	.
17.683	0.7938	0.59	. Q	.	.	.	V	.
17.700	0.7946	0.59	. Q	.	.	.	V	.
17.717	0.7954	0.58	. Q	.	.	.	V	.
17.733	0.7962	0.58	. Q	.	.	.	V	.
17.750	0.7970	0.58	. Q	.	.	.	V	.
17.767	0.7978	0.58	. Q	.	.	.	V	.
17.783	0.7986	0.57	. Q	.	.	.	V	.
17.800	0.7994	0.57	. Q	.	.	.	V	.
17.817	0.8001	0.57	. Q	.	.	.	V	.
17.833	0.8009	0.56	. Q	.	.	.	V	.
17.850	0.8017	0.56	. Q	.	.	.	V	.
17.867	0.8024	0.56	. Q	.	.	.	V	.
17.883	0.8032	0.55	. Q	.	.	.	V	.
17.900	0.8040	0.55	. Q	.	.	.	V	.
17.917	0.8047	0.55	. Q	.	.	.	V	.
17.933	0.8055	0.55	. Q	.	.	.	V	.
17.950	0.8062	0.54	. Q	.	.	.	V	.
17.967	0.8070	0.54	. Q	.	.	.	V	.
17.983	0.8077	0.54	. Q	.	.	.	V	.
18.000	0.8085	0.54	. Q	.	.	.	V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	595.0
20%	170.0
30%	110.0
40%	80.0
50%	70.0
60%	50.0
70%	40.0
80%	25.0
90%	15.0

****
FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 2

>>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
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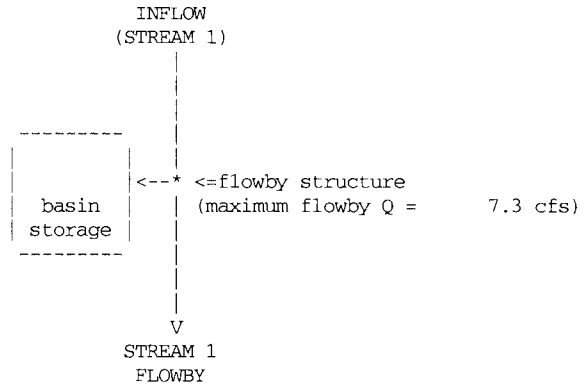
MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
7.3 CFS ARE ASSUMED TO BE EXCESS FLOWS.
FLOW EXCESS IS ASSUMED TO BE PERMANENTLY STORED.



FLOWBY BASIN MODELING RESULTS:

MODEL TIME (HRS)	STREAM 1 INFLOW (CFS)	STREAM 1 FLOWBY (CFS)	BASIN VOLUME (AF)
0.017	0.01	0.01	0.000
0.033	0.03	0.03	0.000
0.050	0.04	0.04	0.000
0.067	0.06	0.06	0.000
0.083	0.08	0.08	0.000
0.100	0.09	0.09	0.000
0.117	0.11	0.11	0.000
0.133	0.13	0.13	0.000
0.150	0.15	0.15	0.000
0.167	0.16	0.16	0.000
0.183	0.16	0.16	0.000
0.200	0.16	0.16	0.000
0.217	0.16	0.16	0.000
0.233	0.16	0.16	0.000
0.250	0.16	0.16	0.000
0.267	0.16	0.16	0.000
0.283	0.16	0.16	0.000
0.300	0.16	0.16	0.000
0.317	0.16	0.16	0.000
0.333	0.16	0.16	0.000

0.350	0.16	0.16	0.000
0.367	0.16	0.16	0.000
0.383	0.16	0.16	0.000
0.400	0.16	0.16	0.000
0.417	0.16	0.16	0.000
0.433	0.16	0.16	0.000
0.450	0.16	0.16	0.000
0.467	0.16	0.16	0.000
0.483	0.16	0.16	0.000
0.500	0.16	0.16	0.000
0.517	0.16	0.16	0.000
0.533	0.16	0.16	0.000
0.550	0.16	0.16	0.000
0.567	0.16	0.16	0.000
0.583	0.16	0.16	0.000
0.600	0.16	0.16	0.000
0.617	0.16	0.16	0.000
0.633	0.16	0.16	0.000
0.650	0.16	0.16	0.000
0.667	0.16	0.16	0.000
0.683	0.17	0.17	0.000
0.700	0.17	0.17	0.000
0.717	0.17	0.17	0.000
0.733	0.17	0.17	0.000
0.750	0.17	0.17	0.000
0.767	0.17	0.17	0.000
0.783	0.17	0.17	0.000
0.800	0.17	0.17	0.000
0.817	0.17	0.17	0.000
0.833	0.17	0.17	0.000
0.850	0.17	0.17	0.000
0.867	0.17	0.17	0.000
0.883	0.17	0.17	0.000
0.900	0.17	0.17	0.000
0.917	0.17	0.17	0.000
0.933	0.17	0.17	0.000
0.950	0.17	0.17	0.000
0.967	0.17	0.17	0.000
0.983	0.17	0.17	0.000
1.000	0.17	0.17	0.000
1.017	0.17	0.17	0.000
1.033	0.17	0.17	0.000
1.050	0.17	0.17	0.000
1.067	0.17	0.17	0.000
1.083	0.17	0.17	0.000
1.100	0.17	0.17	0.000
1.117	0.17	0.17	0.000
1.133	0.17	0.17	0.000
1.150	0.17	0.17	0.000
1.167	0.17	0.17	0.000
1.183	0.17	0.17	0.000
1.200	0.17	0.17	0.000
1.217	0.17	0.17	0.000
1.233	0.17	0.17	0.000
1.250	0.17	0.17	0.000
1.267	0.17	0.17	0.000
1.283	0.17	0.17	0.000
1.300	0.17	0.17	0.000
1.317	0.17	0.17	0.000
1.333	0.17	0.17	0.000
1.350	0.17	0.17	0.000
1.367	0.17	0.17	0.000
1.383	0.17	0.17	0.000
1.400	0.17	0.17	0.000
1.417	0.17	0.17	0.000
1.433	0.17	0.17	0.000
1.450	0.17	0.17	0.000
1.467	0.17	0.17	0.000
1.483	0.17	0.17	0.000
1.500	0.17	0.17	0.000
1.517	0.17	0.17	0.000
1.533	0.17	0.17	0.000
1.550	0.17	0.17	0.000
1.567	0.17	0.17	0.000
1.583	0.17	0.17	0.000
1.600	0.17	0.17	0.000
1.617	0.17	0.17	0.000
1.633	0.17	0.17	0.000
1.650	0.17	0.17	0.000
1.667	0.17	0.17	0.000
1.683	0.17	0.17	0.000
1.700	0.17	0.17	0.000
1.717	0.17	0.17	0.000
1.733	0.17	0.17	0.000
1.750	0.17	0.17	0.000
1.767	0.17	0.17	0.000
1.783	0.17	0.17	0.000
1.800	0.17	0.17	0.000
1.817	0.17	0.17	0.000
1.833	0.17	0.17	0.000
1.850	0.17	0.17	0.000
1.867	0.17	0.17	0.000
1.883	0.17	0.17	0.000
1.900	0.17	0.17	0.000
1.917	0.17	0.17	0.000
1.933	0.17	0.17	0.000
1.950	0.17	0.17	0.000
1.967	0.17	0.17	0.000
1.983	0.17	0.17	0.000
2.000	0.17	0.17	0.000
2.017	0.17	0.17	0.000
2.033	0.17	0.17	0.000
2.050	0.17	0.17	0.000
2.067	0.17	0.17	0.000
2.083	0.18	0.18	0.000
2.100	0.18	0.18	0.000
2.117	0.18	0.18	0.000
2.133	0.18	0.18	0.000
2.150	0.18	0.18	0.000
2.167	0.18	0.18	0.000
2.183	0.18	0.18	0.000
2.200	0.18	0.18	0.000

2.217	0.18	0.18	0.000
2.233	0.18	0.18	0.000
2.250	0.18	0.18	0.000
2.267	0.18	0.18	0.000
2.283	0.18	0.18	0.000
2.300	0.18	0.18	0.000
2.317	0.18	0.18	0.000
2.333	0.18	0.18	0.000
2.350	0.18	0.18	0.000
2.367	0.18	0.18	0.000
2.383	0.18	0.18	0.000
2.400	0.18	0.18	0.000
2.417	0.18	0.18	0.000
2.433	0.18	0.18	0.000
2.450	0.18	0.18	0.000
2.467	0.18	0.18	0.000
2.483	0.18	0.18	0.000
2.500	0.18	0.18	0.000
2.517	0.18	0.18	0.000
2.533	0.18	0.18	0.000
2.550	0.18	0.18	0.000
2.567	0.18	0.18	0.000
2.583	0.18	0.18	0.000
2.600	0.18	0.18	0.000
2.617	0.18	0.18	0.000
2.633	0.18	0.18	0.000
2.650	0.18	0.18	0.000
2.667	0.18	0.18	0.000
2.683	0.18	0.18	0.000
2.700	0.18	0.18	0.000
2.717	0.18	0.18	0.000
2.733	0.18	0.18	0.000
2.750	0.18	0.18	0.000
2.767	0.18	0.18	0.000
2.783	0.18	0.18	0.000
2.800	0.18	0.18	0.000
2.817	0.18	0.18	0.000
2.833	0.18	0.18	0.000
2.850	0.18	0.18	0.000
2.867	0.18	0.18	0.000
2.883	0.18	0.18	0.000
2.900	0.18	0.18	0.000
2.917	0.18	0.18	0.000
2.933	0.18	0.18	0.000
2.950	0.18	0.18	0.000
2.967	0.18	0.18	0.000
2.983	0.18	0.18	0.000
3.000	0.18	0.18	0.000
3.017	0.18	0.18	0.000
3.033	0.18	0.18	0.000
3.050	0.18	0.18	0.000
3.067	0.18	0.18	0.000
3.083	0.18	0.18	0.000
3.100	0.18	0.18	0.000
3.117	0.18	0.18	0.000
3.133	0.18	0.18	0.000
3.150	0.18	0.18	0.000
3.167	0.18	0.18	0.000
3.183	0.18	0.18	0.000
3.200	0.18	0.18	0.000
3.217	0.19	0.19	0.000
3.233	0.19	0.19	0.000
3.250	0.19	0.19	0.000
3.267	0.19	0.19	0.000
3.283	0.19	0.19	0.000
3.300	0.19	0.19	0.000
3.317	0.19	0.19	0.000
3.333	0.19	0.19	0.000
3.350	0.19	0.19	0.000
3.367	0.19	0.19	0.000
3.383	0.19	0.19	0.000
3.400	0.19	0.19	0.000
3.417	0.19	0.19	0.000
3.433	0.19	0.19	0.000
3.450	0.19	0.19	0.000
3.467	0.19	0.19	0.000
3.483	0.19	0.19	0.000
3.500	0.19	0.19	0.000
3.517	0.19	0.19	0.000
3.533	0.19	0.19	0.000
3.550	0.19	0.19	0.000
3.567	0.19	0.19	0.000
3.583	0.19	0.19	0.000
3.600	0.19	0.19	0.000
3.617	0.19	0.19	0.000
3.633	0.19	0.19	0.000
3.650	0.19	0.19	0.000
3.667	0.19	0.19	0.000
3.683	0.19	0.19	0.000
3.700	0.19	0.19	0.000
3.717	0.19	0.19	0.000
3.733	0.19	0.19	0.000
3.750	0.19	0.19	0.000
3.767	0.19	0.19	0.000
3.783	0.19	0.19	0.000
3.800	0.19	0.19	0.000
3.817	0.19	0.19	0.000
3.833	0.19	0.19	0.000
3.850	0.19	0.19	0.000
3.867	0.19	0.19	0.000
3.883	0.19	0.19	0.000
3.900	0.19	0.19	0.000
3.917	0.19	0.19	0.000
3.933	0.19	0.19	0.000
3.950	0.19	0.19	0.000
3.967	0.19	0.19	0.000
3.983	0.19	0.19	0.000
4.000	0.19	0.19	0.000
4.017	0.19	0.19	0.000
4.033	0.19	0.19	0.000
4.050	0.19	0.19	0.000
4.067	0.19	0.19	0.000

4.083	0.19	0.19	0.000
4.100	0.19	0.19	0.000
4.117	0.19	0.19	0.000
4.133	0.19	0.19	0.000
4.150	0.19	0.19	0.000
4.167	0.19	0.19	0.000
4.183	0.19	0.19	0.000
4.200	0.19	0.19	0.000
4.217	0.19	0.19	0.000
4.233	0.19	0.19	0.000
4.250	0.20	0.20	0.000
4.267	0.20	0.20	0.000
4.283	0.20	0.20	0.000
4.300	0.20	0.20	0.000
4.317	0.20	0.20	0.000
4.333	0.20	0.20	0.000
4.350	0.20	0.20	0.000
4.367	0.20	0.20	0.000
4.383	0.20	0.20	0.000
4.400	0.20	0.20	0.000
4.417	0.20	0.20	0.000
4.433	0.20	0.20	0.000
4.450	0.20	0.20	0.000
4.467	0.20	0.20	0.000
4.483	0.20	0.20	0.000
4.500	0.20	0.20	0.000
4.517	0.20	0.20	0.000
4.533	0.20	0.20	0.000
4.550	0.20	0.20	0.000
4.567	0.20	0.20	0.000
4.583	0.20	0.20	0.000
4.600	0.20	0.20	0.000
4.617	0.20	0.20	0.000
4.633	0.20	0.20	0.000
4.650	0.20	0.20	0.000
4.667	0.20	0.20	0.000
4.683	0.20	0.20	0.000
4.700	0.20	0.20	0.000
4.717	0.20	0.20	0.000
4.733	0.20	0.20	0.000
4.750	0.20	0.20	0.000
4.767	0.20	0.20	0.000
4.783	0.20	0.20	0.000
4.800	0.20	0.20	0.000
4.817	0.20	0.20	0.000
4.833	0.20	0.20	0.000
4.850	0.20	0.20	0.000
4.867	0.20	0.20	0.000
4.883	0.20	0.20	0.000
4.900	0.20	0.20	0.000
4.917	0.20	0.20	0.000
4.933	0.20	0.20	0.000
4.950	0.20	0.20	0.000
4.967	0.20	0.20	0.000
4.983	0.20	0.20	0.000
5.000	0.20	0.20	0.000
5.017	0.20	0.20	0.000
5.033	0.20	0.20	0.000
5.050	0.20	0.20	0.000
5.067	0.20	0.20	0.000
5.083	0.20	0.20	0.000
5.100	0.20	0.20	0.000
5.117	0.20	0.20	0.000
5.133	0.20	0.20	0.000
5.150	0.21	0.21	0.000
5.167	0.21	0.21	0.000
5.183	0.21	0.21	0.000
5.200	0.21	0.21	0.000
5.217	0.21	0.21	0.000
5.233	0.21	0.21	0.000
5.250	0.21	0.21	0.000
5.267	0.21	0.21	0.000
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5.400	0.21	0.21	0.000
5.417	0.21	0.21	0.000
5.433	0.21	0.21	0.000
5.450	0.21	0.21	0.000
5.467	0.21	0.21	0.000
5.483	0.21	0.21	0.000
5.500	0.21	0.21	0.000
5.517	0.21	0.21	0.000
5.533	0.21	0.21	0.000
5.550	0.21	0.21	0.000
5.567	0.21	0.21	0.000
5.583	0.21	0.21	0.000
5.600	0.21	0.21	0.000
5.617	0.21	0.21	0.000
5.633	0.21	0.21	0.000
5.650	0.21	0.21	0.000
5.667	0.21	0.21	0.000
5.683	0.21	0.21	0.000
5.700	0.21	0.21	0.000
5.717	0.21	0.21	0.000
5.733	0.21	0.21	0.000
5.750	0.21	0.21	0.000
5.767	0.21	0.21	0.000
5.783	0.21	0.21	0.000
5.800	0.21	0.21	0.000
5.817	0.21	0.21	0.000
5.833	0.21	0.21	0.000
5.850	0.21	0.21	0.000
5.867	0.21	0.21	0.000
5.883	0.21	0.21	0.000
5.900	0.21	0.21	0.000
5.917	0.21	0.21	0.000
5.933	0.21	0.21	0.000

5.950	0.21	0.21	0.000
5.967	0.21	0.21	0.000
5.983	0.22	0.22	0.000
6.000	0.22	0.22	0.000
6.017	0.22	0.22	0.000
6.033	0.22	0.22	0.000
6.050	0.22	0.22	0.000
6.067	0.22	0.22	0.000
6.083	0.22	0.22	0.000
6.100	0.22	0.22	0.000
6.117	0.22	0.22	0.000
6.133	0.22	0.22	0.000
6.150	0.22	0.22	0.000
6.167	0.22	0.22	0.000
6.183	0.22	0.22	0.000
6.200	0.22	0.22	0.000
6.217	0.22	0.22	0.000
6.233	0.22	0.22	0.000
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6.267	0.22	0.22	0.000
6.283	0.22	0.22	0.000
6.300	0.22	0.22	0.000
6.317	0.22	0.22	0.000
6.333	0.22	0.22	0.000
6.350	0.22	0.22	0.000
6.367	0.22	0.22	0.000
6.383	0.22	0.22	0.000
6.400	0.22	0.22	0.000
6.417	0.22	0.22	0.000
6.433	0.22	0.22	0.000
6.450	0.22	0.22	0.000
6.467	0.22	0.22	0.000
6.483	0.22	0.22	0.000
6.500	0.22	0.22	0.000
6.517	0.22	0.22	0.000
6.533	0.22	0.22	0.000
6.550	0.22	0.22	0.000
6.567	0.22	0.22	0.000
6.583	0.22	0.22	0.000
6.600	0.22	0.22	0.000
6.617	0.22	0.22	0.000
6.633	0.22	0.22	0.000
6.650	0.22	0.22	0.000
6.667	0.22	0.22	0.000
6.683	0.23	0.23	0.000
6.700	0.23	0.23	0.000
6.717	0.23	0.23	0.000
6.733	0.23	0.23	0.000
6.750	0.23	0.23	0.000
6.767	0.23	0.23	0.000
6.783	0.23	0.23	0.000
6.800	0.23	0.23	0.000
6.817	0.23	0.23	0.000
6.833	0.23	0.23	0.000
6.850	0.23	0.23	0.000
6.867	0.23	0.23	0.000
6.883	0.23	0.23	0.000
6.900	0.23	0.23	0.000
6.917	0.23	0.23	0.000
6.933	0.23	0.23	0.000
6.950	0.23	0.23	0.000
6.967	0.23	0.23	0.000
6.983	0.23	0.23	0.000
7.000	0.23	0.23	0.000
7.017	0.23	0.23	0.000
7.033	0.23	0.23	0.000
7.050	0.23	0.23	0.000
7.067	0.23	0.23	0.000
7.083	0.23	0.23	0.000
7.100	0.23	0.23	0.000
7.117	0.23	0.23	0.000
7.133	0.23	0.23	0.000
7.150	0.23	0.23	0.000
7.167	0.23	0.23	0.000
7.183	0.23	0.23	0.000
7.200	0.23	0.23	0.000
7.217	0.23	0.23	0.000
7.233	0.23	0.23	0.000
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7.267	0.23	0.23	0.000
7.283	0.23	0.23	0.000
7.300	0.23	0.23	0.000
7.317	0.24	0.24	0.000
7.333	0.24	0.24	0.000
7.350	0.24	0.24	0.000
7.367	0.24	0.24	0.000
7.383	0.24	0.24	0.000
7.400	0.24	0.24	0.000
7.417	0.24	0.24	0.000
7.433	0.24	0.24	0.000
7.450	0.24	0.24	0.000
7.467	0.24	0.24	0.000
7.483	0.24	0.24	0.000
7.500	0.24	0.24	0.000
7.517	0.24	0.24	0.000
7.533	0.24	0.24	0.000
7.550	0.24	0.24	0.000
7.567	0.24	0.24	0.000
7.583	0.24	0.24	0.000
7.600	0.24	0.24	0.000
7.617	0.24	0.24	0.000
7.633	0.24	0.24	0.000
7.650	0.24	0.24	0.000
7.667	0.24	0.24	0.000
7.683	0.24	0.24	0.000
7.700	0.24	0.24	0.000
7.717	0.24	0.24	0.000
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7.750	0.24	0.24	0.000
7.767	0.24	0.24	0.000
7.783	0.24	0.24	0.000
7.800	0.24	0.24	0.000

7.817	0.24	0.24	0.000
7.833	0.24	0.24	0.000
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7.867	0.25	0.25	0.000
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7.900	0.25	0.25	0.000
7.917	0.25	0.25	0.000
7.933	0.25	0.25	0.000
7.950	0.25	0.25	0.000
7.967	0.25	0.25	0.000
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8.017	0.25	0.25	0.000
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8.050	0.25	0.25	0.000
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8.083	0.25	0.25	0.000
8.100	0.25	0.25	0.000
8.117	0.25	0.25	0.000
8.133	0.25	0.25	0.000
8.150	0.25	0.25	0.000
8.167	0.25	0.25	0.000
8.183	0.25	0.25	0.000
8.200	0.25	0.25	0.000
8.217	0.25	0.25	0.000
8.233	0.25	0.25	0.000
8.250	0.25	0.25	0.000
8.267	0.25	0.25	0.000
8.283	0.25	0.25	0.000
8.300	0.25	0.25	0.000
8.317	0.25	0.25	0.000
8.333	0.25	0.25	0.000
8.350	0.26	0.26	0.000
8.367	0.26	0.26	0.000
8.383	0.26	0.26	0.000
8.400	0.26	0.26	0.000
8.417	0.26	0.26	0.000
8.433	0.26	0.26	0.000
8.450	0.26	0.26	0.000
8.467	0.26	0.26	0.000
8.483	0.26	0.26	0.000
8.500	0.26	0.26	0.000
8.517	0.26	0.26	0.000
8.533	0.26	0.26	0.000
8.550	0.26	0.26	0.000
8.567	0.26	0.26	0.000
8.583	0.26	0.26	0.000
8.600	0.26	0.26	0.000
8.617	0.26	0.26	0.000
8.633	0.26	0.26	0.000
8.650	0.26	0.26	0.000
8.667	0.26	0.26	0.000
8.683	0.26	0.26	0.000
8.700	0.26	0.26	0.000
8.717	0.26	0.26	0.000
8.733	0.26	0.26	0.000
8.750	0.26	0.26	0.000
8.767	0.26	0.26	0.000
8.783	0.26	0.26	0.000
8.800	0.26	0.26	0.000
8.817	0.27	0.27	0.000
8.833	0.27	0.27	0.000
8.850	0.27	0.27	0.000
8.867	0.27	0.27	0.000
8.883	0.27	0.27	0.000
8.900	0.27	0.27	0.000
8.917	0.27	0.27	0.000
8.933	0.27	0.27	0.000
8.950	0.27	0.27	0.000
8.967	0.27	0.27	0.000
8.983	0.27	0.27	0.000
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9.017	0.27	0.27	0.000
9.033	0.27	0.27	0.000
9.050	0.27	0.27	0.000
9.067	0.27	0.27	0.000
9.083	0.27	0.27	0.000
9.100	0.27	0.27	0.000
9.117	0.27	0.27	0.000
9.133	0.27	0.27	0.000
9.150	0.27	0.27	0.000
9.167	0.27	0.27	0.000
9.183	0.27	0.27	0.000
9.200	0.27	0.27	0.000
9.217	0.27	0.27	0.000
9.233	0.27	0.27	0.000
9.250	0.28	0.28	0.000
9.267	0.28	0.28	0.000
9.283	0.28	0.28	0.000
9.300	0.28	0.28	0.000
9.317	0.28	0.28	0.000
9.333	0.28	0.28	0.000
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9.367	0.28	0.28	0.000
9.383	0.28	0.28	0.000
9.400	0.28	0.28	0.000
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9.467	0.28	0.28	0.000
9.483	0.28	0.28	0.000
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9.517	0.28	0.28	0.000
9.533	0.28	0.28	0.000
9.550	0.28	0.28	0.000
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9.767	0.29	0.29	0.000
9.783	0.29	0.29	0.000
9.800	0.29	0.29	0.000
9.817	0.29	0.29	0.000
9.833	0.29	0.29	0.000
9.850	0.29	0.29	0.000
9.867	0.29	0.29	0.000
9.883	0.29	0.29	0.000
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9.917	0.29	0.29	0.000
9.933	0.29	0.29	0.000
9.950	0.30	0.30	0.000
9.967	0.30	0.30	0.000
9.983	0.30	0.30	0.000
10.000	0.30	0.30	0.000
10.017	0.30	0.30	0.000
10.033	0.30	0.30	0.000
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10.117	0.30	0.30	0.000
10.133	0.30	0.30	0.000
10.150	0.30	0.30	0.000
10.167	0.30	0.30	0.000
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10.200	0.30	0.30	0.000
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10.317	0.31	0.31	0.000
10.333	0.31	0.31	0.000
10.350	0.31	0.31	0.000
10.367	0.31	0.31	0.000
10.383	0.31	0.31	0.000
10.400	0.31	0.31	0.000
10.417	0.31	0.31	0.000
10.433	0.31	0.31	0.000
10.450	0.31	0.31	0.000
10.467	0.31	0.31	0.000
10.483	0.31	0.31	0.000
10.500	0.31	0.31	0.000
10.517	0.31	0.31	0.000
10.533	0.31	0.31	0.000
10.550	0.31	0.31	0.000
10.567	0.32	0.32	0.000
10.583	0.32	0.32	0.000
10.600	0.32	0.32	0.000
10.617	0.32	0.32	0.000
10.633	0.32	0.32	0.000
10.650	0.32	0.32	0.000
10.667	0.32	0.32	0.000
10.683	0.32	0.32	0.000
10.700	0.32	0.32	0.000
10.717	0.32	0.32	0.000
10.733	0.32	0.32	0.000
10.750	0.32	0.32	0.000
10.767	0.32	0.32	0.000
10.783	0.32	0.32	0.000
10.800	0.32	0.32	0.000
10.817	0.32	0.32	0.000
10.833	0.32	0.32	0.000
10.850	0.33	0.33	0.000
10.867	0.33	0.33	0.000
10.883	0.33	0.33	0.000
10.900	0.33	0.33	0.000
10.917	0.33	0.33	0.000
10.933	0.33	0.33	0.000
10.950	0.33	0.33	0.000
10.967	0.33	0.33	0.000
10.983	0.33	0.33	0.000
11.000	0.33	0.33	0.000
11.017	0.33	0.33	0.000
11.033	0.33	0.33	0.000
11.050	0.33	0.33	0.000
11.067	0.34	0.34	0.000
11.083	0.34	0.34	0.000
11.100	0.34	0.34	0.000
11.117	0.34	0.34	0.000
11.133	0.34	0.34	0.000
11.150	0.34	0.34	0.000
11.167	0.34	0.34	0.000
11.183	0.34	0.34	0.000
11.200	0.34	0.34	0.000
11.217	0.34	0.34	0.000
11.233	0.34	0.34	0.000
11.250	0.34	0.34	0.000
11.267	0.34	0.34	0.000
11.283	0.35	0.35	0.000
11.300	0.35	0.35	0.000
11.317	0.35	0.35	0.000
11.333	0.35	0.35	0.000
11.350	0.35	0.35	0.000
11.367	0.35	0.35	0.000
11.383	0.35	0.35	0.000
11.400	0.35	0.35	0.000
11.417	0.35	0.35	0.000
11.433	0.35	0.35	0.000
11.450	0.35	0.35	0.000
11.467	0.35	0.35	0.000
11.483	0.35	0.35	0.000
11.500	0.35	0.35	0.000
11.517	0.35	0.35	0.000
11.533	0.36	0.36	0.000

11.550	0.36	0.36	0.000
11.567	0.36	0.36	0.000
11.583	0.36	0.36	0.000
11.600	0.36	0.36	0.000
11.617	0.36	0.36	0.000
11.633	0.36	0.36	0.000
11.650	0.36	0.36	0.000
11.667	0.36	0.36	0.000
11.683	0.36	0.36	0.000
11.700	0.36	0.36	0.000
11.717	0.37	0.37	0.000
11.733	0.37	0.37	0.000
11.750	0.37	0.37	0.000
11.767	0.37	0.37	0.000
11.783	0.37	0.37	0.000
11.800	0.37	0.37	0.000
11.817	0.37	0.37	0.000
11.833	0.37	0.37	0.000
11.850	0.37	0.37	0.000
11.867	0.37	0.37	0.000
11.883	0.37	0.37	0.000
11.900	0.38	0.38	0.000
11.917	0.38	0.38	0.000
11.933	0.38	0.38	0.000
11.950	0.38	0.38	0.000
11.967	0.38	0.38	0.000
11.983	0.38	0.38	0.000
12.000	0.38	0.38	0.000
12.017	0.39	0.39	0.000
12.033	0.39	0.39	0.000
12.050	0.39	0.39	0.000
12.067	0.39	0.39	0.000
12.083	0.40	0.40	0.000
12.100	0.40	0.40	0.000
12.117	0.40	0.40	0.000
12.133	0.41	0.41	0.000
12.150	0.42	0.42	0.000
12.167	0.43	0.43	0.000
12.183	0.44	0.44	0.000
12.200	0.46	0.46	0.000
12.217	0.47	0.47	0.000
12.233	0.48	0.48	0.000
12.250	0.50	0.50	0.000
12.267	0.51	0.51	0.000
12.283	0.52	0.52	0.000
12.300	0.53	0.53	0.000
12.317	0.53	0.53	0.000
12.333	0.53	0.53	0.000
12.350	0.53	0.53	0.000
12.367	0.53	0.53	0.000
12.383	0.53	0.53	0.000
12.400	0.53	0.53	0.000
12.417	0.53	0.53	0.000
12.433	0.53	0.53	0.000
12.450	0.54	0.54	0.000
12.467	0.54	0.54	0.000
12.483	0.54	0.54	0.000
12.500	0.54	0.54	0.000
12.517	0.54	0.54	0.000
12.533	0.54	0.54	0.000
12.550	0.55	0.55	0.000
12.567	0.55	0.55	0.000
12.583	0.55	0.55	0.000
12.600	0.55	0.55	0.000
12.617	0.55	0.55	0.000
12.633	0.55	0.55	0.000
12.650	0.55	0.55	0.000
12.667	0.56	0.56	0.000
12.683	0.56	0.56	0.000
12.700	0.56	0.56	0.000
12.717	0.56	0.56	0.000
12.733	0.56	0.56	0.000
12.750	0.56	0.56	0.000
12.767	0.56	0.56	0.000
12.783	0.56	0.56	0.000
12.800	0.56	0.56	0.000
12.817	0.57	0.57	0.000
12.833	0.57	0.57	0.000
12.850	0.57	0.57	0.000
12.867	0.57	0.57	0.000
12.883	0.57	0.57	0.000
12.900	0.58	0.58	0.000
12.917	0.58	0.58	0.000
12.933	0.58	0.58	0.000
12.950	0.58	0.58	0.000
12.967	0.58	0.58	0.000
12.983	0.58	0.58	0.000
13.000	0.59	0.59	0.000
13.017	0.59	0.59	0.000
13.033	0.59	0.59	0.000
13.050	0.59	0.59	0.000
13.067	0.59	0.59	0.000
13.083	0.59	0.59	0.000
13.100	0.59	0.59	0.000
13.117	0.59	0.59	0.000
13.133	0.60	0.60	0.000
13.150	0.60	0.60	0.000
13.167	0.60	0.60	0.000
13.183	0.60	0.60	0.000
13.200	0.61	0.61	0.000
13.217	0.61	0.61	0.000
13.233	0.61	0.61	0.000
13.250	0.61	0.61	0.000
13.267	0.61	0.61	0.000
13.283	0.62	0.62	0.000
13.300	0.62	0.62	0.000
13.317	0.62	0.62	0.000
13.333	0.62	0.62	0.000
13.350	0.62	0.62	0.000
13.367	0.62	0.62	0.000
13.383	0.62	0.62	0.000
13.400	0.62	0.62	0.000

13.417	0.63	0.63	0.000
13.433	0.63	0.63	0.000
13.450	0.63	0.63	0.000
13.467	0.63	0.63	0.000
13.483	0.64	0.64	0.000
13.500	0.64	0.64	0.000
13.517	0.64	0.64	0.000
13.533	0.65	0.65	0.000
13.550	0.65	0.65	0.000
13.567	0.65	0.65	0.000
13.583	0.65	0.65	0.000
13.600	0.66	0.66	0.000
13.617	0.66	0.66	0.000
13.633	0.66	0.66	0.000
13.650	0.66	0.66	0.000
13.667	0.66	0.66	0.000
13.683	0.66	0.66	0.000
13.700	0.66	0.66	0.000
13.717	0.67	0.67	0.000
13.733	0.67	0.67	0.000
13.750	0.67	0.67	0.000
13.767	0.67	0.67	0.000
13.783	0.68	0.68	0.000
13.800	0.68	0.68	0.000
13.817	0.68	0.68	0.000
13.833	0.69	0.69	0.000
13.850	0.69	0.69	0.000
13.867	0.69	0.69	0.000
13.883	0.70	0.70	0.000
13.900	0.70	0.70	0.000
13.917	0.70	0.70	0.000
13.933	0.71	0.71	0.000
13.950	0.71	0.71	0.000
13.967	0.71	0.71	0.000
13.983	0.71	0.71	0.000
14.000	0.71	0.71	0.000
14.017	0.72	0.72	0.000
14.033	0.72	0.72	0.000
14.050	0.72	0.72	0.000
14.067	0.72	0.72	0.000
14.083	0.73	0.73	0.000
14.100	0.73	0.73	0.000
14.117	0.73	0.73	0.000
14.133	0.74	0.74	0.000
14.150	0.74	0.74	0.000
14.167	0.75	0.75	0.000
14.183	0.75	0.75	0.000
14.200	0.75	0.75	0.000
14.217	0.76	0.76	0.000
14.233	0.76	0.76	0.000
14.250	0.77	0.77	0.000
14.267	0.77	0.77	0.000
14.283	0.77	0.77	0.000
14.300	0.78	0.78	0.000
14.317	0.78	0.78	0.000
14.333	0.78	0.78	0.000
14.350	0.78	0.78	0.000
14.367	0.79	0.79	0.000
14.383	0.79	0.79	0.000
14.400	0.80	0.80	0.000
14.417	0.80	0.80	0.000
14.433	0.81	0.81	0.000
14.450	0.82	0.82	0.000
14.467	0.82	0.82	0.000
14.483	0.83	0.83	0.000
14.500	0.84	0.84	0.000
14.517	0.84	0.84	0.000
14.533	0.85	0.85	0.000
14.550	0.86	0.86	0.000
14.567	0.86	0.86	0.000
14.583	0.87	0.87	0.000
14.600	0.87	0.87	0.000
14.617	0.88	0.88	0.000
14.633	0.88	0.88	0.000
14.650	0.88	0.88	0.000
14.667	0.89	0.89	0.000
14.683	0.89	0.89	0.000
14.700	0.90	0.90	0.000
14.717	0.90	0.90	0.000
14.733	0.91	0.91	0.000
14.750	0.92	0.92	0.000
14.767	0.93	0.93	0.000
14.783	0.94	0.94	0.000
14.800	0.95	0.95	0.000
14.817	0.96	0.96	0.000
14.833	0.97	0.97	0.000
14.850	0.98	0.98	0.000
14.867	0.99	0.99	0.000
14.883	1.00	1.00	0.000
14.900	1.00	1.00	0.000
14.917	1.01	1.01	0.000
14.933	1.01	1.01	0.000
14.950	1.02	1.02	0.000
14.967	1.03	1.03	0.000
14.983	1.03	1.03	0.000
15.000	1.04	1.04	0.000
15.017	1.04	1.04	0.000
15.033	1.05	1.05	0.000
15.050	1.06	1.06	0.000
15.067	1.08	1.08	0.000
15.083	1.09	1.09	0.000
15.100	1.11	1.11	0.000
15.117	1.12	1.12	0.000
15.133	1.14	1.14	0.000
15.150	1.15	1.15	0.000
15.167	1.17	1.17	0.000
15.183	1.18	1.18	0.000
15.200	1.19	1.19	0.000
15.217	1.20	1.20	0.000
15.233	1.21	1.21	0.000
15.250	1.22	1.22	0.000
15.267	1.23	1.23	0.000

15.283	1.24	1.24	0.000
15.300	1.25	1.25	0.000
15.317	1.26	1.26	0.000
15.333	1.27	1.27	0.000
15.350	1.28	1.28	0.000
15.367	1.29	1.29	0.000
15.383	1.29	1.29	0.000
15.400	1.29	1.29	0.000
15.417	1.29	1.29	0.000
15.433	1.29	1.29	0.000
15.450	1.29	1.29	0.000
15.467	1.29	1.29	0.000
15.483	1.29	1.29	0.000
15.500	1.29	1.29	0.000
15.517	1.29	1.29	0.000
15.533	1.31	1.31	0.000
15.550	1.33	1.33	0.000
15.567	1.35	1.35	0.000
15.583	1.36	1.36	0.000
15.600	1.38	1.38	0.000
15.617	1.40	1.40	0.000
15.633	1.42	1.42	0.000
15.650	1.44	1.44	0.000
15.667	1.46	1.46	0.000
15.683	1.49	1.49	0.000
15.700	1.56	1.56	0.000
15.717	1.65	1.65	0.000
15.733	1.74	1.74	0.000
15.750	1.83	1.83	0.000
15.767	1.93	1.93	0.000
15.783	2.02	2.02	0.000
15.800	2.11	2.11	0.000
15.817	2.20	2.20	0.000
15.833	2.29	2.29	0.000
15.850	2.38	2.38	0.000
15.867	2.47	2.47	0.000
15.883	2.56	2.56	0.000
15.900	2.65	2.65	0.000
15.917	2.74	2.74	0.000
15.933	2.83	2.83	0.000
15.950	2.93	2.93	0.000
15.967	3.02	3.02	0.000
15.983	3.11	3.11	0.000
16.000	3.20	3.20	0.000
16.017	3.57	3.57	0.000
16.033	4.23	4.23	0.000
16.050	4.88	4.88	0.000
16.067	5.53	5.53	0.000
16.083	6.19	6.19	0.000
16.100	6.84	6.84	0.000
16.117	7.50	7.30	0.000
16.133	8.15	7.30	0.001
16.150	8.80	7.30	0.004
16.167	9.59	7.30	0.007
16.183	8.94	7.30	0.009
16.200	8.14	7.30	0.010
16.217	7.33	7.30	0.010
16.233	6.53	6.53	0.010
16.250	5.72	5.72	0.010
16.267	4.91	4.91	0.010
16.283	4.11	4.11	0.010
16.300	3.30	3.30	0.010
16.317	2.50	2.50	0.010
16.333	1.83	1.83	0.010
16.350	1.72	1.72	0.010
16.367	1.68	1.68	0.010
16.383	1.64	1.64	0.010
16.400	1.60	1.60	0.010
16.417	1.55	1.55	0.010
16.433	1.51	1.51	0.010
16.450	1.47	1.47	0.010
16.467	1.42	1.42	0.010
16.483	1.38	1.38	0.010
16.500	1.35	1.35	0.010
16.517	1.32	1.32	0.010
16.533	1.30	1.30	0.010
16.550	1.27	1.27	0.010
16.567	1.25	1.25	0.010
16.583	1.22	1.22	0.010
16.600	1.20	1.20	0.010
16.617	1.17	1.17	0.010
16.633	1.15	1.15	0.010
16.650	1.12	1.12	0.010
16.667	1.10	1.10	0.010
16.683	1.09	1.09	0.010
16.700	1.07	1.07	0.010
16.717	1.05	1.05	0.010
16.733	1.03	1.03	0.010
16.750	1.02	1.02	0.010
16.767	1.00	1.00	0.010
16.783	0.98	0.98	0.010
16.800	0.96	0.96	0.010
16.817	0.94	0.94	0.010
16.833	0.93	0.93	0.010
16.850	0.92	0.92	0.010
16.867	0.91	0.91	0.010
16.883	0.89	0.89	0.010
16.900	0.88	0.88	0.010
16.917	0.87	0.87	0.010
16.933	0.86	0.86	0.010
16.950	0.85	0.85	0.010
16.967	0.83	0.83	0.010
16.983	0.82	0.82	0.010
17.000	0.81	0.81	0.010
17.017	0.80	0.80	0.010
17.033	0.80	0.80	0.010
17.050	0.79	0.79	0.010
17.067	0.78	0.78	0.010
17.083	0.77	0.77	0.010
17.100	0.76	0.76	0.010
17.117	0.75	0.75	0.010
17.133	0.74	0.74	0.010

17.150	0.74	0.74	0.010
17.167	0.73	0.73	0.010
17.183	0.73	0.73	0.010
17.200	0.72	0.72	0.010
17.217	0.71	0.71	0.010
17.233	0.71	0.71	0.010
17.250	0.70	0.70	0.010
17.267	0.70	0.70	0.010
17.283	0.69	0.69	0.010
17.300	0.69	0.69	0.010
17.317	0.68	0.68	0.010
17.333	0.68	0.68	0.010
17.350	0.67	0.67	0.010
17.367	0.67	0.67	0.010
17.383	0.66	0.66	0.010
17.400	0.66	0.66	0.010
17.417	0.65	0.65	0.010
17.433	0.65	0.65	0.010
17.450	0.64	0.64	0.010
17.467	0.64	0.64	0.010
17.483	0.64	0.64	0.010
17.500	0.63	0.63	0.010
17.517	0.63	0.63	0.010
17.533	0.62	0.62	0.010
17.550	0.62	0.62	0.010
17.567	0.62	0.62	0.010
17.583	0.61	0.61	0.010
17.600	0.61	0.61	0.010
17.617	0.60	0.60	0.010
17.633	0.60	0.60	0.010
17.650	0.60	0.60	0.010
17.667	0.59	0.59	0.010
17.683	0.59	0.59	0.010
17.700	0.59	0.59	0.010
17.717	0.58	0.58	0.010
17.733	0.58	0.58	0.010
17.750	0.58	0.58	0.010
17.767	0.58	0.58	0.010
17.783	0.57	0.57	0.010
17.800	0.57	0.57	0.010
17.817	0.57	0.57	0.010
17.833	0.56	0.56	0.010
17.850	0.56	0.56	0.010
17.867	0.56	0.56	0.010
17.883	0.55	0.55	0.010
17.900	0.55	0.55	0.010
17.917	0.55	0.55	0.010
17.933	0.55	0.55	0.010
17.950	0.54	0.54	0.010
17.967	0.54	0.54	0.010
17.983	0.54	0.54	0.010
18.000	0.54	0.54	0.010
18.017	0.53	0.53	0.010
18.033	0.53	0.53	0.010
18.050	0.53	0.53	0.010
18.067	0.53	0.53	0.010
18.083	0.52	0.52	0.010
18.100	0.52	0.52	0.010
18.117	0.51	0.51	0.010
18.133	0.50	0.50	0.010
18.150	0.48	0.48	0.010
18.167	0.47	0.47	0.010
18.183	0.45	0.45	0.010
18.200	0.44	0.44	0.010
18.217	0.42	0.42	0.010
18.233	0.41	0.41	0.010
18.250	0.39	0.39	0.010
18.267	0.38	0.38	0.010
18.283	0.37	0.37	0.010
18.300	0.37	0.37	0.010
18.317	0.37	0.37	0.010
18.333	0.37	0.37	0.010
18.350	0.37	0.37	0.010
18.367	0.36	0.36	0.010
18.383	0.36	0.36	0.010
18.400	0.36	0.36	0.010
18.417	0.36	0.36	0.010
18.433	0.36	0.36	0.010
18.450	0.36	0.36	0.010
18.467	0.35	0.35	0.010
18.483	0.35	0.35	0.010
18.500	0.35	0.35	0.010
18.517	0.35	0.35	0.010
18.533	0.35	0.35	0.010
18.550	0.35	0.35	0.010
18.567	0.34	0.34	0.010
18.583	0.34	0.34	0.010
18.600	0.34	0.34	0.010
18.617	0.34	0.34	0.010
18.633	0.34	0.34	0.010
18.650	0.34	0.34	0.010
18.667	0.34	0.34	0.010
18.683	0.33	0.33	0.010
18.700	0.33	0.33	0.010
18.717	0.33	0.33	0.010
18.733	0.33	0.33	0.010
18.750	0.33	0.33	0.010
18.767	0.33	0.33	0.010
18.783	0.33	0.33	0.010
18.800	0.33	0.33	0.010
18.817	0.32	0.32	0.010
18.833	0.32	0.32	0.010
18.850	0.32	0.32	0.010
18.867	0.32	0.32	0.010
18.883	0.32	0.32	0.010
18.900	0.32	0.32	0.010
18.917	0.32	0.32	0.010
18.933	0.32	0.32	0.010
18.950	0.31	0.31	0.010
18.967	0.31	0.31	0.010
18.983	0.31	0.31	0.010
19.000	0.31	0.31	0.010

19.017	0.31	0.31	0.010
19.033	0.31	0.31	0.010
19.050	0.31	0.31	0.010
19.067	0.31	0.31	0.010
19.083	0.31	0.31	0.010
19.100	0.30	0.30	0.010
19.117	0.30	0.30	0.010
19.133	0.30	0.30	0.010
19.150	0.30	0.30	0.010
19.167	0.30	0.30	0.010
19.183	0.30	0.30	0.010
19.200	0.30	0.30	0.010
19.217	0.30	0.30	0.010
19.233	0.30	0.30	0.010
19.250	0.29	0.29	0.010
19.267	0.29	0.29	0.010
19.283	0.29	0.29	0.010
19.300	0.29	0.29	0.010
19.317	0.29	0.29	0.010
19.333	0.29	0.29	0.010
19.350	0.29	0.29	0.010
19.367	0.29	0.29	0.010
19.383	0.29	0.29	0.010
19.400	0.29	0.29	0.010
19.417	0.28	0.28	0.010
19.433	0.28	0.28	0.010
19.450	0.28	0.28	0.010
19.467	0.28	0.28	0.010
19.483	0.28	0.28	0.010
19.500	0.28	0.28	0.010
19.517	0.28	0.28	0.010
19.533	0.28	0.28	0.010
19.550	0.28	0.28	0.010
19.567	0.28	0.28	0.010
19.583	0.28	0.28	0.010
19.600	0.28	0.28	0.010
19.617	0.27	0.27	0.010
19.633	0.27	0.27	0.010
19.650	0.27	0.27	0.010
19.667	0.27	0.27	0.010
19.683	0.27	0.27	0.010
19.700	0.27	0.27	0.010
19.717	0.27	0.27	0.010
19.733	0.27	0.27	0.010
19.750	0.27	0.27	0.010
19.767	0.27	0.27	0.010
19.783	0.27	0.27	0.010
19.800	0.27	0.27	0.010
19.817	0.26	0.26	0.010
19.833	0.26	0.26	0.010
19.850	0.26	0.26	0.010
19.867	0.26	0.26	0.010
19.883	0.26	0.26	0.010
19.900	0.26	0.26	0.010
19.917	0.26	0.26	0.010
19.933	0.26	0.26	0.010
19.950	0.26	0.26	0.010
19.967	0.26	0.26	0.010
19.983	0.26	0.26	0.010
20.000	0.26	0.26	0.010
20.017	0.26	0.26	0.010
20.033	0.26	0.26	0.010
20.050	0.25	0.25	0.010
20.067	0.25	0.25	0.010
20.083	0.25	0.25	0.010
20.100	0.25	0.25	0.010
20.117	0.25	0.25	0.010
20.133	0.25	0.25	0.010
20.150	0.25	0.25	0.010
20.167	0.25	0.25	0.010
20.183	0.25	0.25	0.010
20.200	0.25	0.25	0.010
20.217	0.25	0.25	0.010
20.233	0.25	0.25	0.010
20.250	0.25	0.25	0.010
20.267	0.25	0.25	0.010
20.283	0.25	0.25	0.010
20.300	0.24	0.24	0.010
20.317	0.24	0.24	0.010
20.333	0.24	0.24	0.010
20.350	0.24	0.24	0.010
20.367	0.24	0.24	0.010
20.383	0.24	0.24	0.010
20.400	0.24	0.24	0.010
20.417	0.24	0.24	0.010
20.433	0.24	0.24	0.010
20.450	0.24	0.24	0.010
20.467	0.24	0.24	0.010
20.483	0.24	0.24	0.010
20.500	0.24	0.24	0.010
20.517	0.24	0.24	0.010
20.533	0.24	0.24	0.010
20.550	0.24	0.24	0.010
20.567	0.24	0.24	0.010
20.583	0.23	0.23	0.010
20.600	0.23	0.23	0.010
20.617	0.23	0.23	0.010
20.633	0.23	0.23	0.010
20.650	0.23	0.23	0.010
20.667	0.23	0.23	0.010
20.683	0.23	0.23	0.010
20.700	0.23	0.23	0.010
20.717	0.23	0.23	0.010
20.733	0.23	0.23	0.010
20.750	0.23	0.23	0.010
20.767	0.23	0.23	0.010
20.783	0.23	0.23	0.010
20.800	0.23	0.23	0.010
20.817	0.23	0.23	0.010
20.833	0.23	0.23	0.010
20.850	0.23	0.23	0.010
20.867	0.23	0.23	0.010

20.883	0.23	0.23	0.010
20.900	0.22	0.22	0.010
20.917	0.22	0.22	0.010
20.933	0.22	0.22	0.010
20.950	0.22	0.22	0.010
20.967	0.22	0.22	0.010
20.983	0.22	0.22	0.010
21.000	0.22	0.22	0.010
21.017	0.22	0.22	0.010
21.033	0.22	0.22	0.010
21.050	0.22	0.22	0.010
21.067	0.22	0.22	0.010
21.083	0.22	0.22	0.010
21.100	0.22	0.22	0.010
21.117	0.22	0.22	0.010
21.133	0.22	0.22	0.010
21.150	0.22	0.22	0.010
21.167	0.22	0.22	0.010
21.183	0.22	0.22	0.010
21.200	0.22	0.22	0.010
21.217	0.22	0.22	0.010
21.233	0.22	0.22	0.010
21.250	0.21	0.21	0.010
21.267	0.21	0.21	0.010
21.283	0.21	0.21	0.010
21.300	0.21	0.21	0.010
21.317	0.21	0.21	0.010
21.333	0.21	0.21	0.010
21.350	0.21	0.21	0.010
21.367	0.21	0.21	0.010
21.383	0.21	0.21	0.010
21.400	0.21	0.21	0.010
21.417	0.21	0.21	0.010
21.433	0.21	0.21	0.010
21.450	0.21	0.21	0.010
21.467	0.21	0.21	0.010
21.483	0.21	0.21	0.010
21.500	0.21	0.21	0.010
21.517	0.21	0.21	0.010
21.533	0.21	0.21	0.010
21.550	0.21	0.21	0.010
21.567	0.21	0.21	0.010
21.583	0.21	0.21	0.010
21.600	0.21	0.21	0.010
21.617	0.21	0.21	0.010
21.633	0.21	0.21	0.010
21.650	0.20	0.20	0.010
21.667	0.20	0.20	0.010
21.683	0.20	0.20	0.010
21.700	0.20	0.20	0.010
21.717	0.20	0.20	0.010
21.733	0.20	0.20	0.010
21.750	0.20	0.20	0.010
21.767	0.20	0.20	0.010
21.783	0.20	0.20	0.010
21.800	0.20	0.20	0.010
21.817	0.20	0.20	0.010
21.833	0.20	0.20	0.010
21.850	0.20	0.20	0.010
21.867	0.20	0.20	0.010
21.883	0.20	0.20	0.010
21.900	0.20	0.20	0.010
21.917	0.20	0.20	0.010
21.933	0.20	0.20	0.010
21.950	0.20	0.20	0.010
21.967	0.20	0.20	0.010
21.983	0.20	0.20	0.010
22.000	0.20	0.20	0.010
22.017	0.20	0.20	0.010
22.033	0.20	0.20	0.010
22.050	0.20	0.20	0.010
22.067	0.20	0.20	0.010
22.083	0.20	0.20	0.010
22.100	0.19	0.19	0.010
22.117	0.19	0.19	0.010
22.133	0.19	0.19	0.010
22.150	0.19	0.19	0.010
22.167	0.19	0.19	0.010
22.183	0.19	0.19	0.010
22.200	0.19	0.19	0.010
22.217	0.19	0.19	0.010
22.233	0.19	0.19	0.010
22.250	0.19	0.19	0.010
22.267	0.19	0.19	0.010
22.283	0.19	0.19	0.010
22.300	0.19	0.19	0.010
22.317	0.19	0.19	0.010
22.333	0.19	0.19	0.010
22.350	0.19	0.19	0.010
22.367	0.19	0.19	0.010
22.383	0.19	0.19	0.010
22.400	0.19	0.19	0.010
22.417	0.19	0.19	0.010
22.433	0.19	0.19	0.010
22.450	0.19	0.19	0.010
22.467	0.19	0.19	0.010
22.483	0.19	0.19	0.010
22.500	0.19	0.19	0.010
22.517	0.19	0.19	0.010
22.533	0.19	0.19	0.010
22.550	0.19	0.19	0.010
22.567	0.19	0.19	0.010
22.583	0.19	0.19	0.010
22.600	0.18	0.18	0.010
22.617	0.18	0.18	0.010
22.633	0.18	0.18	0.010
22.650	0.18	0.18	0.010
22.667	0.18	0.18	0.010
22.683	0.18	0.18	0.010
22.700	0.18	0.18	0.010
22.717	0.18	0.18	0.010
22.733	0.18	0.18	0.010

22.750	0.18	0.18	0.010
22.767	0.18	0.18	0.010
22.783	0.18	0.18	0.010
22.800	0.18	0.18	0.010
22.817	0.18	0.18	0.010
22.833	0.18	0.18	0.010
22.850	0.18	0.18	0.010
22.867	0.18	0.18	0.010
22.883	0.18	0.18	0.010
22.900	0.18	0.18	0.010
22.917	0.18	0.18	0.010
22.933	0.18	0.18	0.010
22.950	0.18	0.18	0.010
22.967	0.18	0.18	0.010
22.983	0.18	0.18	0.010
23.000	0.18	0.18	0.010
23.017	0.18	0.18	0.010
23.033	0.18	0.18	0.010
23.050	0.18	0.18	0.010
23.067	0.18	0.18	0.010
23.083	0.18	0.18	0.010
23.100	0.18	0.18	0.010
23.117	0.18	0.18	0.010
23.133	0.18	0.18	0.010
23.150	0.18	0.18	0.010
23.167	0.18	0.18	0.010
23.183	0.18	0.18	0.010
23.200	0.17	0.17	0.010
23.217	0.17	0.17	0.010
23.233	0.17	0.17	0.010
23.250	0.17	0.17	0.010
23.267	0.17	0.17	0.010
23.283	0.17	0.17	0.010
23.300	0.17	0.17	0.010
23.317	0.17	0.17	0.010
23.333	0.17	0.17	0.010
23.350	0.17	0.17	0.010
23.367	0.17	0.17	0.010
23.383	0.17	0.17	0.010
23.400	0.17	0.17	0.010
23.417	0.17	0.17	0.010
23.433	0.17	0.17	0.010
23.450	0.17	0.17	0.010
23.467	0.17	0.17	0.010
23.483	0.17	0.17	0.010
23.500	0.17	0.17	0.010
23.517	0.17	0.17	0.010
23.533	0.17	0.17	0.010
23.550	0.17	0.17	0.010
23.567	0.17	0.17	0.010
23.583	0.17	0.17	0.010
23.600	0.17	0.17	0.010
23.617	0.17	0.17	0.010
23.633	0.17	0.17	0.010
23.650	0.17	0.17	0.010
23.667	0.17	0.17	0.010
23.683	0.17	0.17	0.010
23.700	0.17	0.17	0.010
23.717	0.17	0.17	0.010
23.733	0.17	0.17	0.010
23.750	0.17	0.17	0.010
23.767	0.17	0.17	0.010
23.783	0.17	0.17	0.010
23.800	0.17	0.17	0.010
23.817	0.17	0.17	0.010
23.833	0.17	0.17	0.010
23.850	0.17	0.17	0.010
23.867	0.17	0.17	0.010
23.883	0.16	0.16	0.010
23.900	0.16	0.16	0.010
23.917	0.16	0.16	0.010
23.933	0.16	0.16	0.010
23.950	0.16	0.16	0.010
23.967	0.16	0.16	0.010
23.983	0.16	0.16	0.010
24.000	0.16	0.16	0.010

END OF FLOODSCx ROUTING ANALYSIS

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

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 ************************* DESCRIPTION OF STUDY *************************
* W.O. 4198-1, NOHL CONDOS                                              *
* 25-YR STUDY                                                           *
* PROPOSED CONDITION WITH A FLOW-BY DETENTION BASIN                     *
 ************************************************************************

  FILE NAME: NOHL-PD.DAT
  TIME/DATE OF STUDY: 10:35 04/11/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ====  ====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      1.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  ELEVATION DATA: UPSTREAM(FEET) =    861.42  DOWNSTREAM(FEET) =    860.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.568
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.815
  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.)
  CONDOMINIUMS                D        0.52      0.20      0.350    75    7.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      1.75
  TOTAL AREA(ACRES) =      0.52   PEAK FLOW RATE(CFS) =      1.75

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   859.30
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.75
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE      2.00 =     307.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    8.19
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.649
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                D        0.79      0.20      0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =     0.79      SUBAREA RUNOFF(CFS) =     2.54
  EFFECTIVE AREA(ACRES) =      1.31   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       4.22

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.30  DOWNSTREAM(FEET) =   859.20
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```
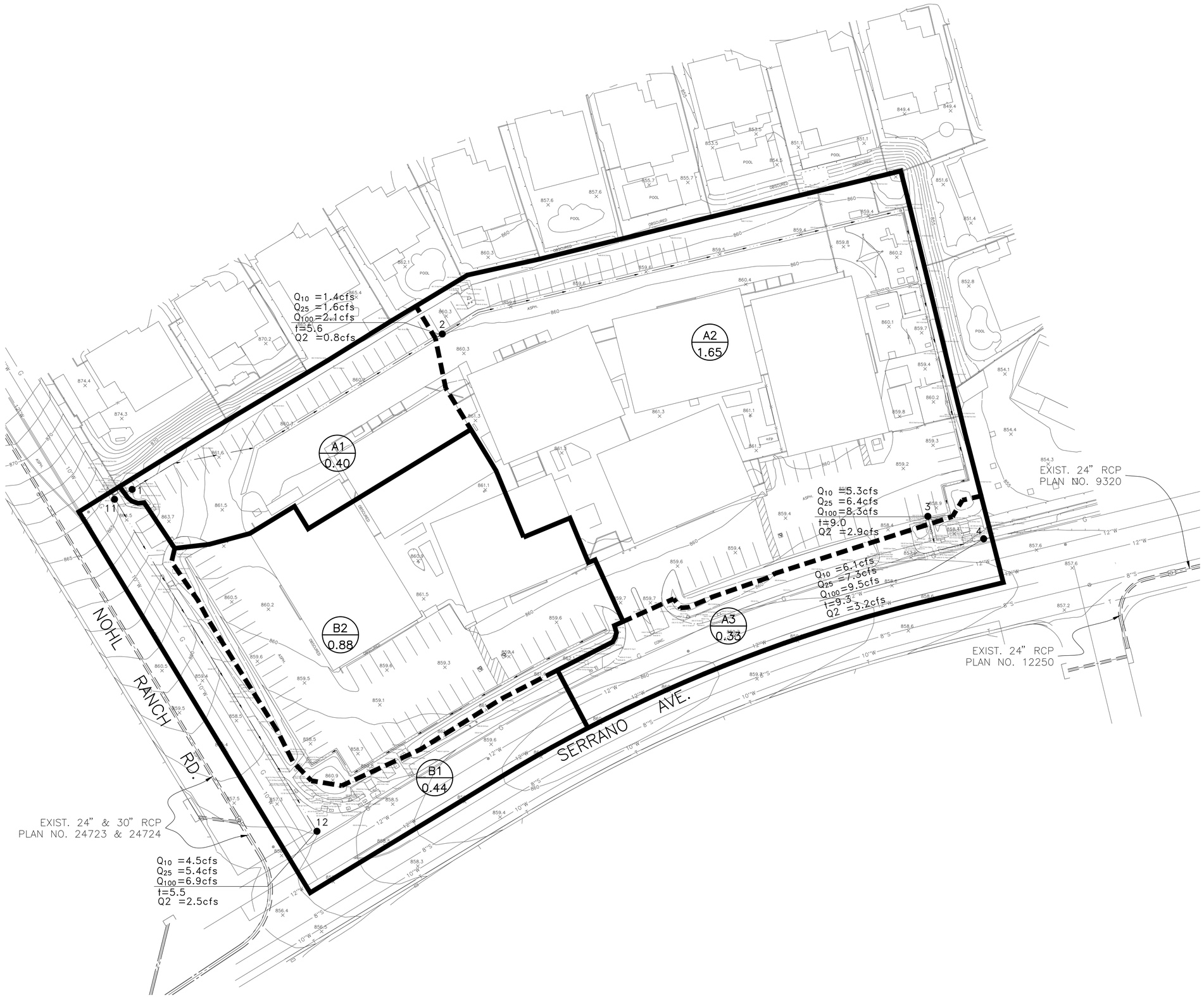
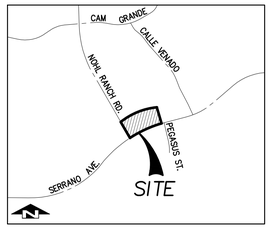

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.22
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.27
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      3.00 =     327.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.27
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.629
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.64      0.20      0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     2.05
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       6.25

****************************************************************************
 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) =   859.20  DOWNSTREAM(FEET) =   858.20
 FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.19
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.25
 PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    9.28
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      4.00 =     582.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.28
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.399
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS               D        0.89      0.20      0.350    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     2.67
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       8.51

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   858.20  DOWNSTREAM(FEET) =   858.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.51
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.42
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE      4.10 =     622.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.10 TO NODE      4.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =    9.28   RAINFALL INTENSITY(INCH/HR) =  3.40
 EFFECTIVE AREA(ACRES) =     2.05
 TOTAL AREA(ACRES) =     2.05        PEAK FLOW RATE(CFS) =      6.15
 AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.20
 AREA-AVERAGED Ap =  0.35
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE      4.10 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) =   858.00  DOWNSTREAM(FEET) =   857.80
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.06
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.15
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    9.49
 LONGEST FLOWPATH FROM NODE      4.10 TO NODE      5.00 =     672.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.49
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.357
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 COMMERCIAL                  D        0.14      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.14      SUBAREA RUNOFF(CFS) =     0.42
 EFFECTIVE AREA(ACRES) =      2.19   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
 TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.49

****************************************************************************
 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) =   857.80  DOWNSTREAM(FEET) =   857.30
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.49
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    9.71
 LONGEST FLOWPATH FROM NODE      4.10 TO NODE      6.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.71
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.314
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.31      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) =     0.31      SUBAREA RUNOFF(CFS) =     0.92
 EFFECTIVE AREA(ACRES) =      2.50   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =        2.5       PEAK FLOW RATE(CFS) =       7.32

****************************************************************************
 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) =   262.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.534
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.555
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        0.41      0.20     0.100    75    5.53
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.67
 TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      1.67
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        0.4  TC(MIN.) =      5.53
 EFFECTIVE AREA(ACRES) =      0.41  AREA-AVERAGED Fm(INCH/HR)=  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS)    =       1.67
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

SECTION 4

HYDROLOGY MAPS





VICINITY MAP

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 1 — NODE NUMBER
- A / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Qa =6.0cfs, Qb=8.0cfs, t=15.0, C.B. #1 — PEAK FLOW RATE / TIME OF CONCENTRATION
- D — SOIL GROUP

SCALE: 1" = 30'

30 15 0 30 90

GRAPHIC SCALE 1"=30'

PREPARED FOR:

6509 Serrano L.P.
Mr. John Saunders
4040 MACARTHUR BOULEVARD, SUITE 300
NEWPORT BEACH, CA 92660

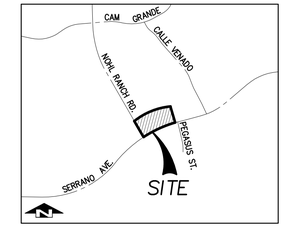
PREPARED BY:

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

HYDROLOGY MAP
NOHL RANCH CONDOS
TTM NO. 18104
EXISTING CONDITION

W.O. #4198-1

PLOTTED BY: Tu Trinh DATE: Dec. 04, 2018 05:57:25 PM FILE: F:\0985\Engineering\SY_Hydrology\Serrano-Existing.dwg



VICINITY MAP

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- A / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Q_{10}=6.0cfs, Q_{100}=8.0cfs, t=15.0, C.B. #1 — PEAK FLOW RATE / TIME OF CONCENTRATION
- D — SOIL GROUP

SINGLE-FAMILY EXISTING RESIDENTIAL TRACT NO. 8375 M.M. 345/34,39 ZONE: RS-2

NAP

SINGLE-FAMILY EXISTING RESIDENTIAL TRACT NO. 8375 M.M. 345/34,39 ZONE: RS-2

NAP

NAP

UNDEVELOPED PROPERTY ZONE: T RURAL ZONE

ANAHEIM HILLS ELEMENTARY SCHOOL ZONE: T TRANSITIONAL ZONE

SINGLE-FAMILY EXISTING RESIDENTIAL TRACT NO. 9313 M.M. 399-32,33 ZONE: RS-3

NOHL RANCH RD.

SERRANO AVE.

PEGASUS ST.

DRIVE 'A'

DRIVE 'B'

A1 0.79 — ΣQ_{10} =3.5cfs, ΣQ_{25} =4.2cfs, ΣQ_{100}=5.4cfs, t=8.2, $\Sigma Q2$ =1.9cfs

A2 0.64 — ΣQ_{10} =5.2cfs, ΣQ_{25} =6.3cfs, ΣQ_{100}=8.0cfs, t=8.3, $\Sigma Q2$ =2.8cfs

A3 0.89 — ΣQ_{10} =7.1cfs, ΣQ_{25} =8.5cfs, ΣQ_{100}=11.0cfs, t=9.4, $\Sigma Q2$ =3.8cfs

A4 0.14 — ΣQ_{10} =7.3cfs, ΣQ_{25} =8.8cfs, ΣQ_{100}=11.3cfs, t=9.7, $\Sigma Q2$ =3.9cfs

A5 0.31 — ΣQ_{25} =9.6cfs Without Basin; ΣQ_{25} =7.3cfs With Basin

A0 0.52 — ΣQ_{10} =7.9cfs, ΣQ_{25} =9.6cfs, ΣQ_{100}=12.4cfs, t=9.9, $\Sigma Q2$ =4.2cfs

B1 0.41 — Q_{10} =1.4cfs, Q_{25} =1.7cfs, Q_{100}=2.2cfs, t=5.5, Q2 =0.8cfs

Q_{10} =2.1cfs, Q_{25} =2.5cfs, Q_{100}=3.3cfs, t=8.2, Q2 =1.2cfs

Q_{10} =1.7cfs, Q_{25} =2.1cfs, Q_{100}=2.6cfs, t=8.3, Q2 =0.9cfs

Q_{10} =1.5cfs, Q_{25} =1.8cfs, Q_{100}=2.3cfs, t=7.6, Q2 =0.8cfs

Q_{10} =0.3cfs, Q_{25} =0.4cfs, Q_{100}=0.5cfs, t=9.7, Q2 =0.2cfs

TO FRONT OF C.B. Q_{10} =0.8cfs, Q_{25} =0.9cfs, Q_{100}=1.2cfs, t=9.9, Q2 =0.4cfs

Q_{10} =2.3cfs, Q_{25} =2.7cfs, Q_{100}=3.4cfs, t=9.4, Q2 =1.2cfs

PROPOSED UNDERGROUND FLOW-BY DETENTION BASIN

Q_{25}=8.5cfs(in-flow)
Q_{25}=6.2cfs(out-flow)
Q_{25}=2.3cfs(detained)
Vol Required=436cu.ft

EXIST. 24" RCP PLAN NO. 9320

EXIST. 24" RCP PLAN NO. 12250

EXIST. 24" & 30" RCP PLAN NO. 24723 & 24724

15X4 MWS

4X4 MWS

6X4 MWS

SCALE: 1" = 30'

30 15 0 30 90

GRAPHIC SCALE 1"=30'

NOTES:
THE PROPOSED PUBLIC C.B. AT NODE 6 SHALL HAVE CONNECTOR PIPE FULL CAPTURE SCREENS AND AUTOMATIC RETRACTABLE SCREENS ON THE CURB SURFACE THAT MEET THE FULL CAPTURE REQUIREMENTS OF THE STATE TRASH PROVISIONS

PER CITY DIRECTION THE HYDROLOGY ROUTING WAS CHANGED NOVEMBER 2018 BASED ON THE REQUIREMENT TO COMPLY WITH CITY MASTER DRAINAGE PLAN AS REQUESTED BY CITY OF ANAHEIM STAFF. THE REROUTING OF THE ONSITE DRAINAGE AREAS WERE ALTERED TO FOLLOW THE DESIGNDIRECTION AND THE ALREADY APPROVED MASTER DRAINAGE PLAN. THE CHANGES IDENTIFIED IN THE SUMMARY TABLE IN INTRODUCTION, SECTION 1. D. DISCUSSION, OF THIS HYDROLOGY ANALYSIS ILLUSTRATE THE REVISIONS. AREA"B" DRAINAGE IN PROPOSED Q25 CONDITION IS REDUCED BY 3.5cfs WHILE AREA"A" DRAINAGE IN PROPOSED Q25 INCREASED BY 2.3cfs

GRADES WERE ADJUSTED TO REDUCE POTENTIAL FLOODING TO GARAGES. REFER TO FLOODING EXHIBIT NOHL RANCH CONDOS TTM NO. 18104

PREPARED FOR:

6509 Serrano L.P.
Mr. John Saunders
4040 MACARTHUR BOULEVARD, SUITE 300
NEWPORT BEACH, CA 92660

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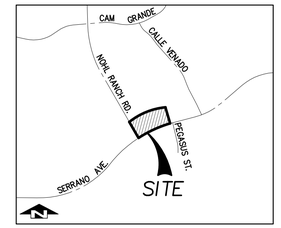
IRVINE, INC.
PLANNING ■ ENGINEERING ■ SURVEYING
Three Hughes ■ Irvine, CA 92618 ■ PH: (949) 583-1010 ■ FX: (949) 583-0759

HYDROLOGY MAP
NOHL RANCH CONDOS
TTM NO. 18104
PROPOSED CONDITION

W.O. #4198-1

PLOTTED BY: Tu Trinh DATE: May. 09, 2019 09:07:13 AM FILE: F:\0985\Engineering\SY_Hydrology\Serrano-Proposed-R6.dwg

FLOODING EXHIBIT



VICINITY MAP

LEGEND

FLOODING AREA

MIN. F.F. = 861.42
MIN. G.F.F. = 860.31
OVERFLOW EL = 860.30

SCALE: 1" = 30'

30 15 0 30 90

GRAPHIC SCALE 1"=30'

PREPARED FOR:

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FLOODING EXHIBIT

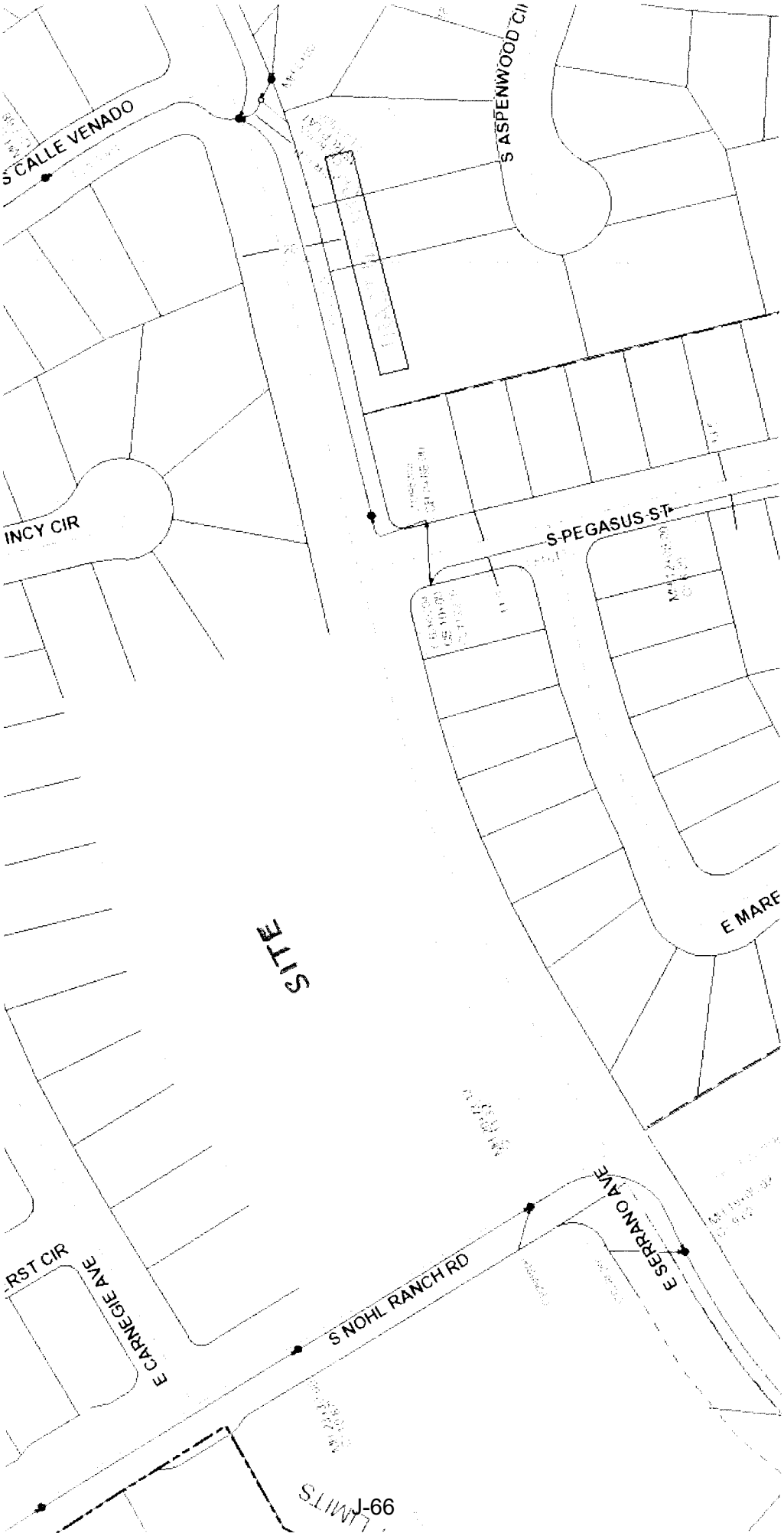
NOHL RANCH CONDOS
TTM NO. 18104

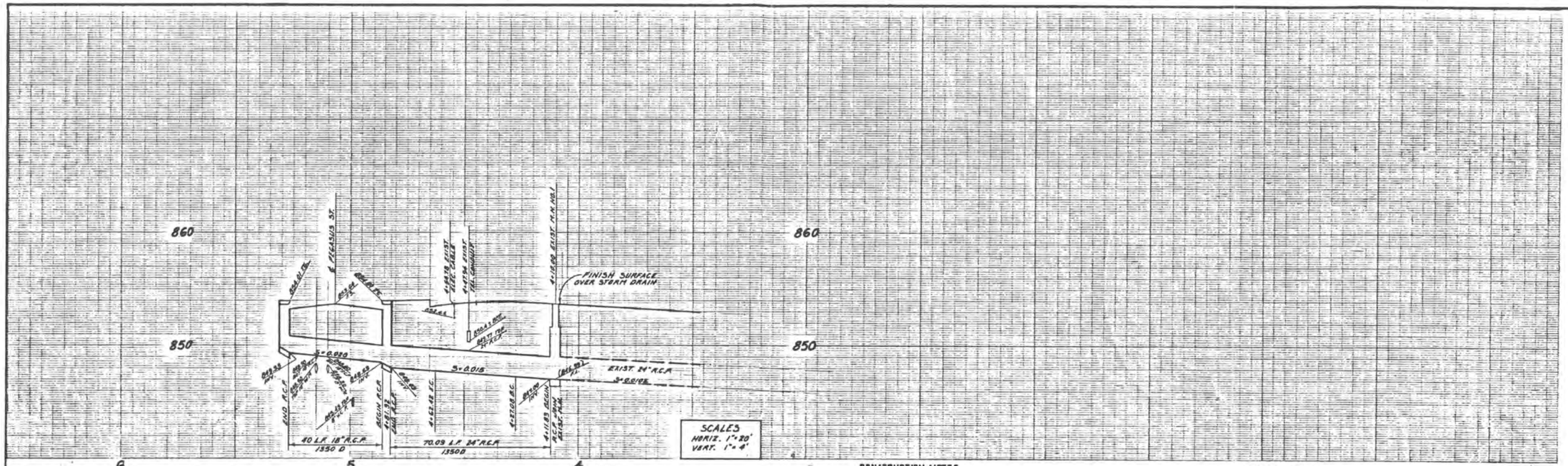
W.O. #4198-1

PLOTTED BY: Tu Trinh DATE: Apr. 15, 2019 04:48:29 PM FILE: F:\0985\Engineering\SY_Hydrology\Serrano-Ponding-Exhibit.dwg

SECTION 5

REFERENCES


S CALLE VENADO
S ASPENWOOD CI
INCY CIR
S PEGASUS ST
E MARE
SITE
RST CIR
E CARNEGIE AVE
S NOHL RANCH RD
E SERRANO AVE
LIMITS



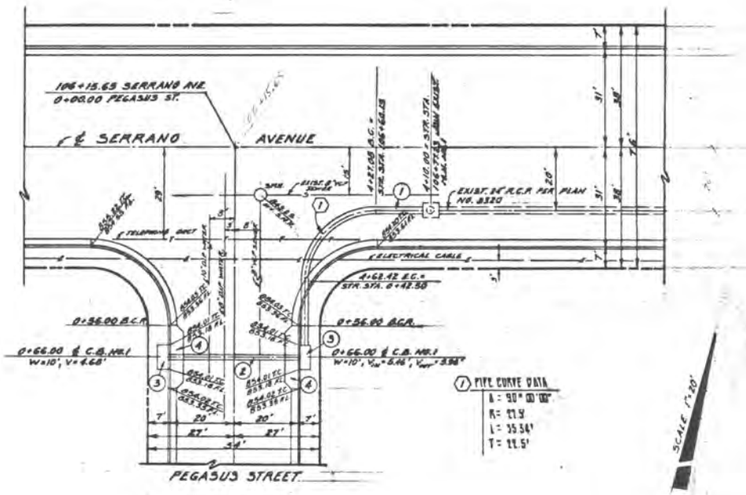
SCALES
HORIZ. 1"=20'
VERT. 1"=4'

CONSTRUCTION NOTES

1. CONST. 24" R.C.P. (PER PROFILE)
2. CONST. 18" R.C.P. (PER PROFILE)
3. CATCH BASIN NO. 1 PER STD. DETAIL NO. 321-A
4. LOCAL DEPRESSION TYPE 'C' PER STD. DETAIL NO 308-B

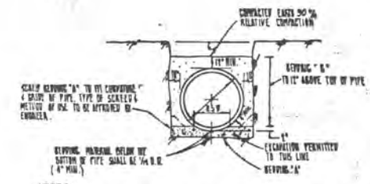
GENERAL NOTES:

1. ELEVATIONS SHOWN ARE IN FEET ABOVE U.S.G.S. MEAN SEA LEVEL DATUM.
2. STATIONS SHOWN ON THE DRAWINGS ARE ALONG THE ℄ OF THE CONDUIT OR ON A LINE NORMAL TO THE ℄ OF THE CONDUIT.
3. ALL PIPE SHALL BE KEYED ACCORDING TO DETAIL SHOWN HEREON.
4. ALL WORK SHOWN ON THESE PLANS SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF THE STD. SPEC. FOR PUBLIC WORKS CONST., CITY OF ANAHEIM STANDARD PLANS AND/OR CONTRACT DOCUMENTS AND SPECIFICATIONS AND THE LATEST REVISIONS THERE OF.



STORM DRAIN QUANTITIES

ITEM	AMOUNT	UNIT
CATCH BASIN NO 1 W/LOCAL DEPRESSION	2	EA
18" R.C.P. (1350 D)	40	LF
24" R.C.P. (1350 D)	70	LF
REMOVE & REPLACE IN KIND 0.39AC/0.05AE	160	SF



NOTES:

1. BEDDING "A" SHALL BE COMPOSED OF SAND, NO. 8 R.M.A. CRUSHED ROCK, GRAVEL OR OTHER GRANULAR MATERIAL AS MAY BE SPECIFIED OR OTHERWISE APPROVED BY THE ENGINEER. MAX. ROCK OR GRAVEL SIZE SHALL BE NO. 3 FOR PIPES 21" & LARGER & NO. 4 FOR PIPES SMALLER THAN 21" (MIN. SE 25)
2. BEDDING "B" SHALL BE COMPOSED OF SAND OR NATIVE MATERIAL SELECTED AND APPROVED BY THE ENGINEER AND SHALL BE COMPLETE PRIOR TO PLACING THE BACKFILL (MIN. SE 25)

BEDDING AND BACKFILL FOR R.C.P.
N.T.S.

APPROVED ONLY FOR INSPECTION OF MATERIALS AND WORKMANSHIP ON PRIVATE PROPERTY FROM 0+31 TO SOUTHERLY AS NECESSARY IN PEGASUS STREET

James P. Craddock 12-5-76
CITY ENGINEER DATE

THIS PLAN HAS BEEN EXAMINED AND IS APPROVED ONLY AS TO COMPATIBILITY WITH ADJOINING EXISTING OR FUTURE IMPROVEMENTS AND CONFORMANCE WITH CITY OF ANAHEIM STANDARD DETAILS AND THE REQUIREMENTS FOR THE FOLLOWING APPLICABLE FACTORS: RIGHT OF WAY, ROADWAY MATERIALS, ALIGNMENTS AND GRADES, HYDROLOGY AND HYDRAULICS DESIGN OF STORM DRAIN OR SANITARY SEWER SYSTEMS AND UNDERGROUND CONDUIT OR OPEN CHANNEL ALIGNMENTS, GRADES, SIZES AND MATERIALS.

NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS APPROVAL OF THIS PLAN BY THE CITY OF ANAHEIM DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OF THE LOCATION OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

BENCH MARK

CITY OF ANAHEIM BENCH MARK # 195-55-74 ON MOUNTAIN ROAD BRASS CAP MARKED "CITY OF ANAHEIM" TOP OF CURB AT RCR. NE CORNER OF SERRANO AVENUE AND MOUNTAIN ROAD.

ELEV. 859.858 (1964)

REVISIONS

NO.	DATE	INITIAL	DESCRIPTION	APP.

REFERENCES

PLANS FOR THESE IMPROVEMENTS ANAHEIM STANDARD DETAILS

STREET	11985-11987; STORM DRAIN 12250
SEWER	11988-11990

APPROVED [illegible] 11-29-76
ELECTRICAL SUPERVISOR DATE

APPROVED Tom Fox 11/9/76
WATER SUPER. DATE

SCALE: AS NOTED

PREPARED UNDER THE SUPERVISION OF Thomas E. Johnson, REG. NO. 20191 — DATE 10-22-76

CHECKED BY

RECMD. BY

APPROVED William D. Hewitt, ASST. CITY ENGINEER — 9-26-77

STORM DRAIN
TRACT NO. 9313
PEGASUS AND SERRANO STS.

CITY OF ANAHEIM

SHEET 1 OF 1 SHEETS

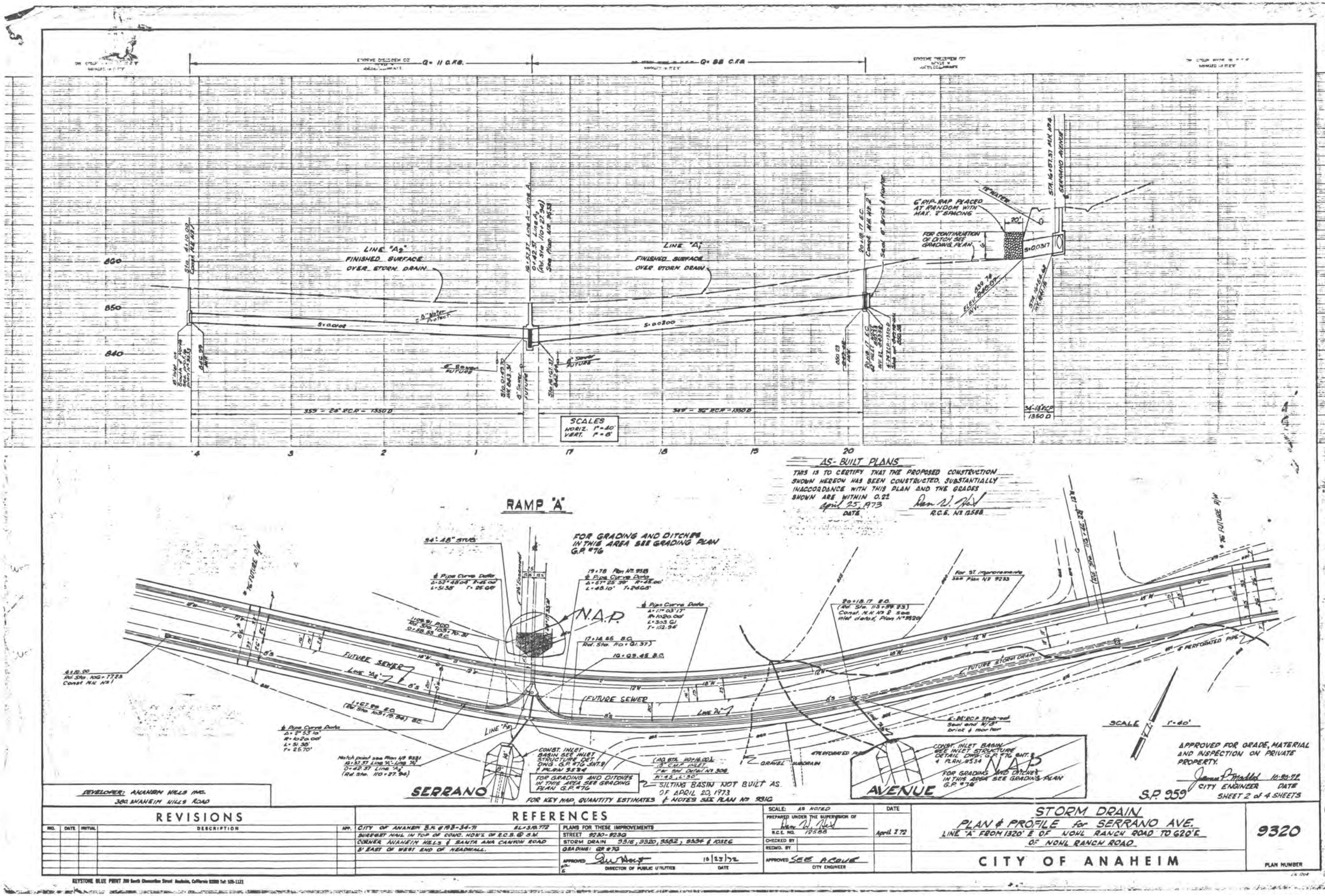
12250

PLAN NUMBER

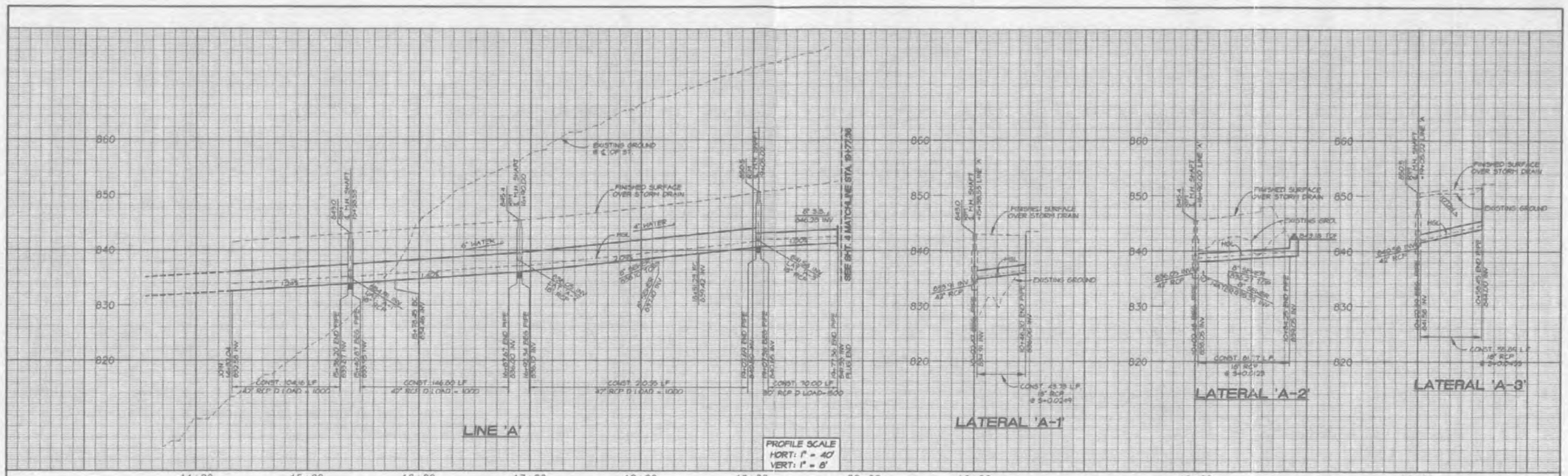
12250

814-0910

KEYSTONE BLUE PRINT 210 South Clementine Street Anaheim, California 92805 Tel: 535-1121



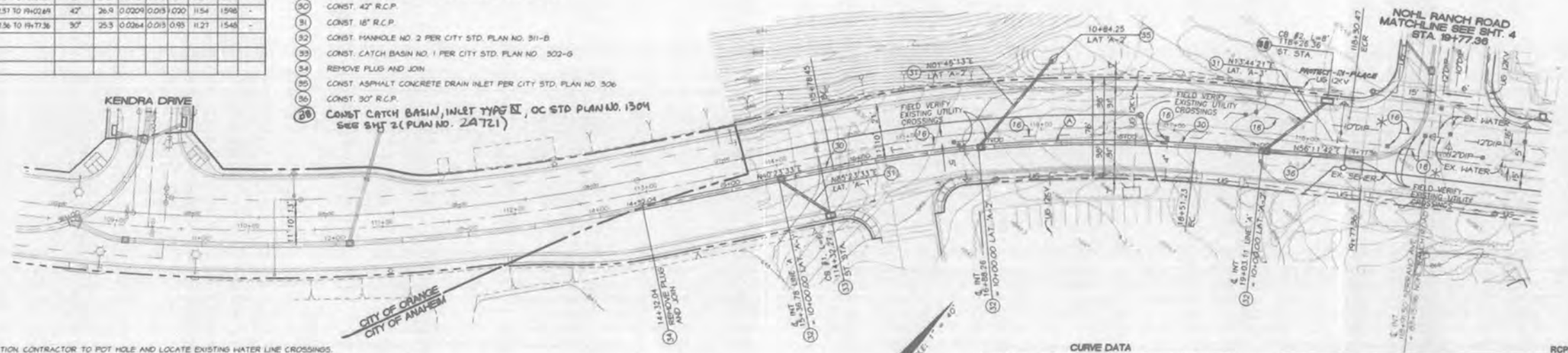
LINE "A2" FINISHED SURFACE OVER STORM DRAIN
LINE "A" FINISHED SURFACE OVER STORM DRAIN
SCALES HORIZ. 1" = 40' VERT. 1" = 8'
RAMP "A"
AS-BUILT PLANS
THIS IS TO CERTIFY THAT THE PROPOSED CONSTRUCTION SHOWN HEREON HAS BEEN CONSTRUCTED SUBSTANTIALLY IN ACCORDANCE WITH THIS PLAN AND THE GRADES SHOWN ARE WITHIN 0.2'
April 25, 1973
DATE
R.C.E. No 12588
FOR GRADING AND DITCHES IN THIS AREA SEE GRADING PLAN G.P. #76
N.A.P.
FUTURE SEWER
FUTURE STORM DRAIN
SILTING BASIN NOT BUILT AS OF APRIL 20, 1973
SERRANO
AVENUE
SCALE 1" = 40'
APPROVED FOR GRADE, MATERIAL AND INSPECTION ON PRIVATE PROPERTY.
CITY ENGINEER DATE
S.P. 959
SHEET 2 of 4 SHEETS
DEVELOPER: ANAHEIM HILLS INC. 380 ANAHEIM HILLS ROAD
FOR KEY MAP, QUANTITY ESTIMATES & NOTES SEE PLAN No 9310
REVISIONS
NO. DATE INITIAL DESCRIPTION APP.
REFERENCES
CITY OF ANAHEIM B.M. # 9B-34-71 EL=318.772
SURVEY NAIL IN TOP OF CONC. HDW'L OF R.C.B. @ S.W. CORNER ANAHEIM HILLS & SANTA ANA CANYON ROAD 5' EAST OF WEST END OF HEADWALL.
PLANS FOR THESE IMPROVEMENTS
STREET 9230-9230
STORM DRAIN 9316, 9320, 9582, 9534 & 10326
GRADING: GP #76
APPROVED DIRECTOR OF PUBLIC UTILITIES 10/23/72 DATE
SCALE: AS NOTED
PREPARED UNDER THE SUPERVISION OF
R.C.E. NO. 12588
DATE April 1972
CHECKED BY
RECMD. BY
APPROVED SEE ABOVE CITY ENGINEER
STORM DRAIN
PLAN & PROFILE for SERRANO AVE.
LINE "A" FROM 1320' E OF NOHL RANCH ROAD TO 620' E OF NOHL RANCH ROAD
CITY OF ANAHEIM
9320
PLAN NUMBER
KEYSTONE BLUE PRINT



LINE	STA. TO STA.	PIPE DIA.	Q_{10}	S_O	n	D_b	V_b (FPS)	D_c	V_c (FPS)
A	14+52.04 TO 15+36.20	42"	52.9	0.0124	0.013	1.3	10.10	1.776	-
A	15+40.87 TO 16+87.67	42"	31.6	0.0140	0.013	1.241	11.07	1.759	-
A	16+92.57 TO 19+02.69	42"	26.9	0.0209	0.013	1.020	11.54	1.598	-
A	19+07.36 TO 19+77.36	30"	25.3	0.0264	0.013	0.93	11.27	1.548	-

CONSTRUCTION NOTES:

(16) PROTECT EXISTING WATER MAINS AND VALVES IN PLACE
(30) CONST. 42" R.C.P.
(31) CONST. 18" R.C.P.
(32) CONST. MANHOLE NO. 2 PER CITY STD. PLAN NO. 311-B
(33) CONST. CATCH BASIN NO. 1 PER CITY STD. PLAN NO. 302-G
(34) REMOVE PLUG AND JOIN
(35) CONST. ASPHALT CONCRETE DRAIN INLET PER CITY STD. PLAN NO. 306
(36) CONST. 30" R.C.P.
(38) CONST CATCH BASIN, INLET TYPE BI, OC STD PLAN NO. 1304 SEE SHT 2 (PLAN NO. 24721)



* PRIOR TO EXCAVATION, CONTRACTOR TO POT HOLE AND LOCATE EXISTING WATER LINE CROSSINGS.
* PROTECT IN PLACE EXISTING ELECTRICAL FACILITIES

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT
(A)	18° 20' 05"	989.00'	316.45'	159.60'
(B)	89° 59' 16"	45.00'	70.68'	44.99'

THESE PLANS HAVE BEEN EXAMINED AND IS APPROVED ONLY AS TO COMPATIBILITY WITH ADJOINING EXISTING OR FUTURE IMPROVEMENTS AND CONFORMANCE WITH CITY OF ANAHEIM STANDARD DETAILS AND THE REQUIREMENT FOR FOLLOWING APPLICABLE FACTORS: RIGHT-OF-WAY, ROADWAY MATHEMATICS, ALIGNMENTS AND GRADES, HYDROLOGY AND HYDRAULIC DESIGN OF STORM DRAIN OR SANITARY SEWER SYSTEMS AND UNDERGROUND CONDUIT OR OPEN-CHANNEL ALIGNMENTS, GRADES, SIZES AND MATERIALS.

ENGINEER'S NOTE TO CONTRACTOR:
THE EXISTENCE LOCATION OF ANY UNDERGROUND UTILITIES, PIPE, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF THOSE TO BE USED OF ANY UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES AS SHOWN HEREON.

NOTE:
FOR GENERAL NOTES, VICINITY MAP, AND LOCATION/KEY MAP SEE PLAN # 1 OF 4

SERRANO AVENUE

SCALE: 1" = 40'

REVISIONS

NO.	INIT	DATE	DESCRIPTION	APP'D	DATE

REFERENCES

BENCH MARK: ELEVATION: 858.26 (1988 NAVD)
DESCRIBED:
BRASS CAP MARKED "C OF A B.M."
ON TOP OF CURB AT THE N.E. BCR
OF SERRANO AVENUE AND NOHL RANCH RAOD

PLANS FOR THESE IMPROVEMENTS:
CITY STANDARD DETAILS
STREET:
SEWER:
STORM DRAIN:

APP'D ELECTRICAL ENG. DATE 9/7/01
APP'D WATER ENG. DIVISION DATE 9-6-01

SCALE: AS SHOWN
PREPARED UNDER THE SUPERVISION OF: R.C.E. NO. 43836 EXP. 06/30/05 — DATE 8/31/01
RECOMMEND APPROVAL: DEVELOPMENT SERVICES MANAGER — DATE 4-25-02
APPROVED: DIRECTOR P.W./CITY ENGINEER — DATE 5.9.02

S. D. IMPROVEMENT PLANS
FOR
SERRANO AVENUE
(FROM NOHL RANCH RD TO 240 FT W/o NOHL RANCH ROAD)
SITE ADDRESS: TRACT 14360 (CITY OF ORANGE)
SOUTH OF RIVERSIDE FREEWAY AND
750 FEET WEST OF NOHL RANCH ROAD

CITY OF ANAHEIM

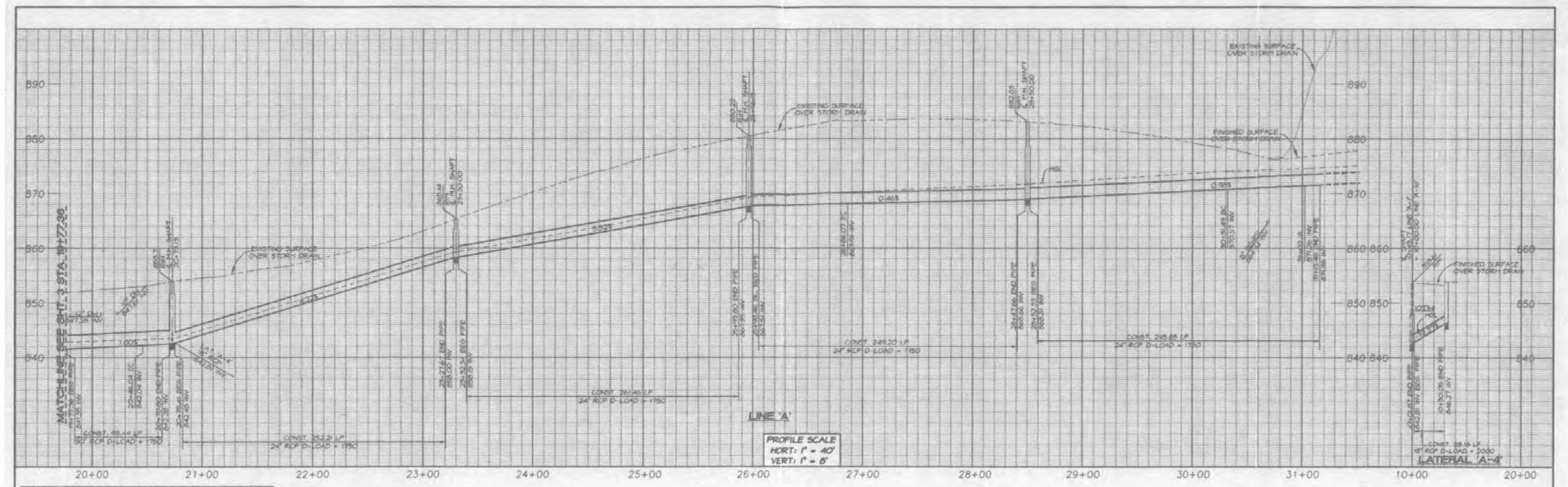
RCP2001-02298
SHT. 3 OF 4
PLAN NO. 24723

RCP2001-2298

ENGINEER:
FUSCOE ENGINEERING
16795 Von Karman, Ste. 100
Irvine, California 92606
Phone (949) 474-1960
FAX (949) 474-5315

OWNER/DEVELOPER:
SERRANO HEIGHTS EAST, LLC
5109 E. LA PALMA, SUITE D
ANAHEIM, CA. 92807
PHONE: (714) 693-8700

24723 D-286

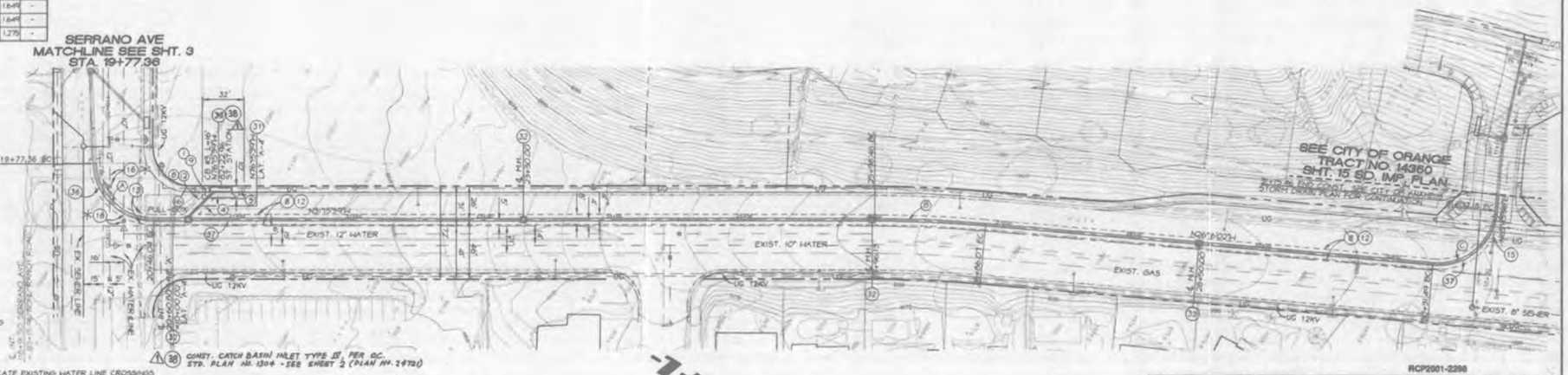


LINE	STA. TO STA.	PIPE DIA.	Q_D	S_D	n	D_n	V_n FPS	D_f	V_f FPS
A	19+77.36 TO 20+10.80	90"	25.3	0.0079	0.013	0.87	15.66	1.545	-
A	20+75.41 TO 23+27.67	24"	21.2	0.0555	0.013	0.925	14.90	1.849	-
A	23+32.34 TO 25+93.80	24"	21.2	0.0046	0.013	2.00	7.30	1.849	-
A	25+98.46 TO 28+17.66	24"	21.2	0.0047	0.013	0.87	6.26	1.275	-

CONSTRUCTION NOTES:

1. CONSTRUCT 6" CURB AND GUTTER (TYPE A) PER CITY STD. NO. 104-D
3. CONST. SIDEWALK PER CITY STD. PLAN NO. 110-D
4. CONST. LOCAL DEPRESSION PER CITY STD. PLAN NO. 308-D, TYPE 'A'
6. REMOVE EXISTING A.C. PAVEMENT
9. REMOVE EXISTING 6" CURB AND GUTTER WITH SIDEWALK
12. RESURFACE EXISTING A.C. PAVEMENT TO MATCH FINISHED GRADE
13. REMOVE PORTION OF EXISTING VALLEY GUTTER AS SHOWN PER PLAN AND RECONSTRUCT CROSS GUTTER TO MATCH EXISTING GRADE PER CITY STD. NO. 108
16. PROTECT EXISTING WATER MAINS AND VALVES IN PLACE
30. CONST. 42" R.C.P.
31. CONST. 18" R.C.P.
32. CONST. MANHOLE NO. 2 PER CITY STD. PLAN NO. 311-B
30. CONST. 42" R.C.P.
31. CONST. 18" R.C.P.
32. CONST. MANHOLE NO. 2 PER CITY STD. PLAN NO. 311-B
35. CONST. CATCH BASIN NO. 1 PER CITY STD. PLAN NO. 302-D
36. CONST. 30" R.C.P.
37. CONST. 24" R.C.P.

⊕ PRIOR TO EXCAVATION, CONTRACTOR TO POT HOLE AND LOCATE EXISTING WATER LINE CROSSINGS
⊕ PROTECT IN PLACE EXISTING ELECTRICAL FACILITIES



THESE PLANS HAVE BEEN EXAMINED AND IS APPROVED ONLY AS TO COMPATIBILITY WITH ADJOINING EXISTING OR FUTURE IMPROVEMENTS AND CONFORMANCE WITH CITY OF ANAHEIM STANDARD DETAILS, AND THE REQUIREMENT FOR FOLLOWING APPLICABLE FACTORS: RIGHT-OF-WAY, ROADWAY MATERIALS, ALIGNMENTS AND GRADES, HYDROLOGY AND HYDRAULIC DESIGN OF STORM DRAIN OR SANITARY SEWER SYSTEMS AND UNDERGROUND CONDUIT OR OPEN-CHANNEL ALIGNMENTS, GRADES, SIZES AND MATERIALS

ENGINEER'S NOTE TO CONTRACTOR:
THE EXISTENCE LOCATION OF ANY UNDERGROUND UTILITIES, PIPE, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF THOSE TO BE USED OF ANY UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES AS SHOWN HEREON.

NOTE:
FOR GENERAL NOTES, VICINITY MAP, AND LOCATION/KEY MAP SEE PLAN # 1 OF 4.

NOHL RANCH ROAD

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT
A	87° 27' 21"	45.00'	68.69'	43.04'
B	04° 59' 37"	1005.00'	87.59'	43.82'
C	90° 01' 89"	45.00'	70.69'	37.64'

ENGINEER:
FUSCOE ENGINEERING
16795 Von Karman, Ste. 100
Irvine, California 92606
Phone (949) 474-1960
FAX (949) 474-5515

OWNER/DEVELOPER:
SERRANO HEIGHTS EAST, LLC
5109 E. LA PALMA, SUITE D
ANAHEIM, CA., 92807
PHONE (714) 693-8700

RCP2001-2298

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE
1		6/14/02	REVISED CB No. 3 to CONST. 15"RCP No. 35 FROM 90"RCP 35		

REFERENCES

BENCH MARK: ELEVATION: 858.26 (1988 NAVD)
DESCRIBED:
BRASS CAP MARKED "C OF A B.M."
ON TOP OF CURB AT THE N.E. BCR
OF SERRANO AVENUE AND NOHL RANCH RAOD

PLANS FOR THESE IMPROVEMENTS:
CITY STANDARD DETAILS
STREET:
SEWER:
STORM DRAIN:

APP'D [signature] ELECTRICAL ENG. MANAGER, WATER DIVISION
DATE 9/7/01

APP'D M. Taylor WATER ENG. DIVISION
DATE 9-6-01

SCALE: AS SHOWN

PREPARED UNDER THE SUPERVISION OF: [signature] 8/31/01
R.C.E. NO. 43836 EXP. 06/30/05

RECOMMEND APPROVAL: [signature] DEVELOPMENT SERVICES MANAGER 4-26-02

APPROVED [signature] DIRECTOR OF PUBLIC WORKS/CITY ENGINEER 5-9-02

DATE 8/31/01

S. D. IMPROVEMENT PLANS
FOR
NOHL RANCH RAOD
(FROM 1,125 FT N/O SERRANO AVE TO SERRANO AVE)

SITE ADDRESS: TRACT 14360 (CITY OF ORANGE)
SOUTH OF RIVERSIDE FREEWAY AND
750 FEET WEST OF NOHL RANCH ROAD

CITY OF ANAHEIM

RCP2001-2298
SHT. 4 OF 4
PLAN NO. 24724

24724 D-206

DRAINAGE DISTRICT 39

6 Drainage District 39

Drainage District 39 is comprised of approximately 2,452 acres and is bounded by Walnut Canyon Channel (E01S09) and Leandro Street to the west, the Santa Ana River to the north, Eucalyptus Drive and Mohler Drive to the east, and the Anaheim Hills ridge line to the south. The district is dominated by residential and open space land uses. Though the storm drains primarily convey flow south to north, it is important to note that the Santa Ana Canyon Road is without standard curb and gutter design on either one or both sides of the road from the intersection of Imperial Highway to the intersection of Quintana Drive. No flooding is shown on Santa Ana Canyon Road. The majority of the District drains to the Walnut Canyon Channel (E01S09), while the most eastern portion of the district is directly tributary to the Santa Ana River. District 39 contains a FEMA floodplain in the Anaheim Hills Golf Course. The floodplain is completely contained within the golf course and does not contribute to any street flooding.

District 39 is broken up into 17 sub-districts based on hydrology. Some sub-districts drain directly into other sub-districts. The majority of the district drains east to west and south to north and is tributary to the Santa Ana River.

6.1 Hydrologic Analysis

There are a total of three hydrology models with some sub-districts combined to create cohesive models. Sub-districts 39-1 thru 39-12 and 39-13 thru 39-16 were combined respectively. The analysis was conducted per the methods discussed in Section 2 and the hydrology models can be found in Appendix A. See Exhibit 4 for the District 39 hydrology map. Table 6-1 summarizes the District 39 hydrology models.

In some confluence nodes where a stream is added to the mainline stream within AES, the TC calculation combined with the confluence calculation can result in a total flowrate that is less than that of the most recent upstream flowrate. Due to restrictions in the XPSWMM model, flow cannot be removed from the system, therefore the upstream flow is used in this situation.

Table 6-1: District 39 Hydrology Analysis Summary

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
Sub-district 39-1 thru 39-12					
287438	Point Premier	2.3	5	6	8
287337	Point Premier	6.4	13	16	21
287236	E Avenida De Santiago	11.4	23	28	36
288135	E Avenida De Santiago	21.0	42	51	66
217320	E Avenida De Santiago	50.4	100	122	158
217308	S Hidden Canyon Rd	74.1	141	172	226
217306	Serrano Ave	92.1	173	212	278
217101a	S Park Rim Cir	92.1	173	212	278

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences
*=Slightly higher value used in XPSWMM model based on XP confluence calculation
~=Unit hydrograph flow
+=Upstream flow was used since downstream flow < upstream flow

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
217240	E Columbus Dr	1.2	3	4	5
217239	E Columbus Dr	4.9	11	14	18
217238	E Columbus Dr	19.0	43	52	67
217235	E Columbus Dr	40.2	88	107	138
217231	E Columbus Dr	74.8	159	193	252
217122	Columbus Way & Serrano Ave & S Lake Summit Dr	92.9	191	233	303
217120	S Lake Summit Dr	105.7	217	263	343
217108	E Shorecrest Dr	117.8	237	288	376
217101b	S Park Rim Cir	209.9	402	491	644
211402a	Periphery Rd	236.7	402	494	652
287209	E Avenida De Santiago	2.2	7	9	11
287208	E Georgetown Cir	5.5	16	19	25
211407	E Georgetown Cir	11.1	32	38	50
217306	E Georgetown Cir	11.1	32	38	50
211405	Williams Cir	21.4	58	71	93
211404	Loyola Dr	32.5	85	104	137
211403	Loyola Dr	70.7	178	218	290
211402b	Periphery Rd	307.4	530	650	856
211301a	E Walnut Canyon Rd	319.8	530	650	856
287422	S Burlwood Dr	7.0	23	27	35
287221	S Burlwood Dr	14.6	41	50	65
287220	S Rimwood Dr	30.6	86	105	136
287119	S Rimwood Dr	46.5	126	154	202
287115	Serrano Ave	94.6	250	305	404
205405	S Calle Venado	129.6	324	400	533
211301b	E Kentucky Ave	461.7	818	998	1321
211101	E Walnut Canyon Rd	513.5	861	1051	1405
205204	E Walnut Canyon Rd	637.7	1058	1308	1744
204303	E Walnut Canyon Rd	688.8	1010~	1259~	1665~
204302	E Walnut Canyon Rd	758.5	1045~	1303~	1735~
198401a	Nohl Ranch Rd	839.8	1048~	1312~	1764~
285238	Chadwick Pkwy	1.0	2	3	3
205337	Chadwick Pkwy	2.6	5	6	8

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences

*=Slightly higher value used in XPSWMM model based on XP confluence calculation

~=Unit hydrograph flow

+=Upstream flow was used since downstream flow < upstream flow

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
286136	E Altaview Dr	4.4	8	9	12
205335	Nohl Ranch Rd	10.7	18	22	29
205330	Nohl Ranch Rd	27.1	45	55	72
205127	Nohl Ranch Rd	34.6	57	70	91
205120	Nohl Ranch Rd	54.3	87	107	140
199214	Nohl Ranch Rd	87.4	139	170	224
199207	Nohl Ranch Rd	112.2	172	212	279
198401b	Nohl Ranch Rd	112.2	172	212	279
199404	E Lookout Ln	6.3	22	26	34
199403	E Lookout Ln	16.6	50	60	79
199402	S Highland Ln	39.2	112	135	176
199401	S Highland Ln & S Fairway Ln	39.2	112	135	176
198401c	Nohl Ranch Rd	1054.1	1296~	1626~	2186~
198351a	Nohl Ranch Rd	1087.3	1290~	1624~	2187~
199354	S Amber Ln	3.0	10	13	16
199353	S Amber Ln	9.6	29	35	46
199348	Camino Grande	16.3	46	55	72
199345	Camino Grande	25.6	70	85	110
199338a	Camino Grande	36.1	92	112	146
285103	E Twin Peak Cir	4.3	9	11	15
284202	E Twin Peak Cir	11.6	24	29	37
284201	S Sapphire Ln	31.8	64	77	100
199338b	S Sapphire Ln	80.3	161	195	254
193429	Camino Grande	111.3	229	278	362
199105	Stage Coach Rd	161.2	330	402	525
198309	Stage Coach Rd	190.9	390	475	624
198351b	Nohl Ranch Rd	1278.2	1494~*	1883~*	2540~*
192445a	Nohl Ranch Rd	1278.2	1494~*	1883~*	2540~*
204105	E Via Corral	2.4	6	7	9
204104	E Via Corral	6.4	13	16	21
204103	E Canyon Rim Rd	12.1	21	26	33
198202	E Canyon Rim Rd	19.8	32	40	52
198101	E Canyon Rim Rd	40.1	63	78	102
192445b	E Canyon Rim Rd	1338.9	1553~	1960~	2643~

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences

*=Slightly higher value used in XPSWMM model based on XP confluence calculation

~=Unit hydrograph flow

+=Upstream flow was used since downstream flow < upstream flow

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
192236	Nohl Ranch Rd	1399.7	1603~	2016~	2729~
191429	Anaheim Hills Rd	1431.8	1585~+	2014~+	2740~
191216a	Anaheim Hills Rd	1491.0	1596~	2040~	2793~
192141	E Marsha Cir	2.0	4	5	6
192140	E Marsha Cir	4.7	8	9	12
192139	S Leandro St	9.6	16	19	25
192138	S Leandro St	17.6	28	34	45
191337	S Leandro St	30.4	45	56	73
191133	S Leandro St	44.6	65	80	104
191230	E Santa Ana Canyon Rd	48.5	68	84	110
191216b	E Santa Ana Canyon Rd	48.5	68	84	110
197315	S Royal Ridge Dr	1.8	4	4	6
197314	S Royal Ridge Dr & S Whitestone Dr	4.9	8	10	13
197313	S Ramsgate Dr	12.7	20	24	31
197312	S Ramsgate Dr & E Trail Dr	27.4	42	51	67
197111	S Quintana Dr	45.0	68	83	109
197110	S Quintana Dr	54.5	81	100	131
197109	E Arboretum Rd	80.2	117	145	191
191103	E Arboretum Rd	103.7	144	179	235
191216c	Anaheim Hills Rd	1643.2	1745~*	2224~*	3058~*
191214a	Anaheim Hills Rd	1643.2	1745~*	2224~*	3058~*
197143	S Canyon Woods Rd	2.0	6	7	9
197142	S Canyon Woods Rd & E Rio Grande Dr	6.8	17	21	27
197141	E Rio Grande Dr & S Quintana Dr	15.1	32	39	51
196339	S Quintana Dr	23.4	46	57	75
197138	E Santa Ana Canyon Rd	44.1	82	101	132
191232	E Santa Ana Canyon Rd	48.8	82	101	135
191214b	Anaheim Hills Rd	1692.0	1780~*	2273~*	3127~*
190406a	Anaheim Hills Rd & N Avenida Palmera	1692.0	1780~*	2273~*	3127~*
196348	E Santa Ana Canyon Rd	0.6	2	2	3
196347	E Santa Ana Canyon Rd	1.4	4	4	6
196346	S Quintana Dr	3.2	7	8	11
196345	N Paseo Rio Blanco	6.3	11	14	19
196344	N Paseo Rio Blanco	10.8	17	21	28

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences

*=Slightly higher value used in XPSWMM model based on XP confluence calculation

~=Unit hydrograph flow

+=Upstream flow was used since downstream flow < upstream flow

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
190435a	N Paseo Rio Blanco	13.5	19	25	33
196342	Fairmont Blvd	1.8	6	8	10
196141	Fairmont Blvd & N Circulo Robel	5.4	15	18	24
196140	N Circulo Robel	12.9	28	34	45
190435b	N Circulo Robel & E Camino Manzano	41.2	64	80	107
190423a	E Camino Manzano	50.8	76	95	127
191251	E Paseo Rio Verde	1.8	3	4	5
190450	E Paseo Rio Verde & N Avenida Barca	7.4	13	15	20
190430a	N Avenida Barca	15.9	25	30	40
196355	S Quintana Dr	1.3	4	5	6
196354	S Quintana Dr & E Camino Correr	7.3	17	12	27
190453	E Camino Correr & N Avenida Cienega	12.4	24	29	39
190430b	E Calle Pantano	33.8	58	66	87
190423b	E Calle Pantano & N Camino Arroyo	89.4	133	166	220
190406b	E Camino Manzano	1789.2	1797~	2324~	3195~
190301	Riverside Fwy (91 FWY)	1789.2	1797~	2324~	3195~
Sub-district 39-13 thru 39-16					
210105	E Canyon Rim Rd	2.3	6	8	10
204204	E Canyon Rim Rd	6.5	14	17	22
204203	E Canyon Rim Rd & Via Arboles	18.1	35	42	55
203379a	Via Arboles	30.4	52	64	84
198210	E Calle Del Norte	1.6	5	6	8
204109	E Calle Del Norte	5.1	13	16	21
204108	E Calle Del Norte	15.6	38	46	59
204107	Via Estrada	38.3	90	110	144
203379b	Via Arboles	78.6	155	189	247
197471	S Canyon Ridge Dr	94.5	186	227	299
197264	S Whitestone Dr & S Remington Ct	110.5	213	261	347
197263	S Remington Ct	120.6	231	284	378
197258	S Health Terrace	129.5	244	301	403
196415a	E Santa Ana Canyon Rd	138.1	253	313	417
203470	E Canyon Rim Rd	0.8	2	2	3
203469	E Canyon Rim Rd & S Fairmont Blvd	2.5	5	7	8
203468	S Fairmont Blvd	5.9	12	15	19

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences

*=Slightly higher value used in XPSWMM model based on XP confluence calculation

~=Unit hydrograph flow

+=Upstream flow was used since downstream flow < upstream flow

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
203467	S Fairmont Blvd	15.0	28	35	45
203463	S Fairmont Blvd	23.6	44	53	70
203158	S Fairmont Blvd	44.9	81	99	129
203153	S Fairmont Blvd	67.8	119	146	191
197237	S Willowcreek Ln	84.5	145	177	232
196417a	S Fairmont Blvd	100.3	166	204	267
209348	Bunting Ct	1.1	2	3	3
209347	Bunting Ct & E Hummingbird Cir	3.5	6	8	10
209346	E Hummingbird Cir	9.1	16	19	25
203245	Falling Star Dr	57.8	88	108	142
203244	S Country Hill Rd	73.1	105	130	170
203243	S Country Hill Rd	101.4	139	172	226
203240	S Country Hill Rd	114.1	155	193	253
202333	S Old Bridge Rd	121.9	163	203	267
196441	S Del Giorgio Rd	141.3	183	228	301
196417b	E Santa Ana Canyon Rd	241.6	326*	402*	529*
196415b	E Santa Ana Canyon Rd	379.7	551*	679*	893*
196102a	Fairmont Blvd & Riverside Fwy (91 FWY)	379.7	551*	679*	893*
201428	S Eucalyptus Dr	1.3	4	4	5
201327	S Eucalyptus Dr	3.9	10	12	15
201326	N Eucalyptus Dr & E Calle Durango & E Camino Tampico	20.0	41	50	65
196225	E Camino Tampico	51.4	86	106	140
196203	N Ave Rio Bravo & E Calle Granada	118.1	176	222	299
196102b	Riverside Fwy (91 FWY)	497.8	719*	893*	1183*
196101	Riverside Fwy (91 FWY)	497.8	719*	893*	1183*
Sub-district 39-17					
202144	S Mohler Dr	2.5	7	8	10
202143	S Shivom Ct	9.3	24	29	37
202142	S Timken Rd	22.3	52	63	82
202141	S Mohler Dr	39.5	82	100	131
202140	S Mohler Dr	60.9	115	141	186
202121	S Mohler Dr	128.8	232	288	383
202118a	E Santa Ana Canyon Rd	139.9	250	310	412

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences

*=Slightly higher value used in XPSWMM model based on XP confluence calculation

~=Unit hydrograph flow

+=Upstream flow was used since downstream flow < upstream flow

Node	Location	Drainage Area	10-Year Flow	25-Year Flow	100-Year Flow
		(ac)	(cfs)	(cfs)	(cfs)
202206	S Eucalyptus Dr	2.1	6	7	9
202205	S Trish Ct	4.9	13	16	20
202204	S Trish Ct & E Silver Dollar Ln	11.4	22	27	36
202103	E Silver Dollar Ln & Triple Crown Ln	17.1	33	40	53
202102	Triple Crown Ln	26.0	48	59	78
202101	S Canyon Crest Dr	26.0	48	59	78
202118b	E Santa Ana Canyon Rd	165.5	298	369	489
195401	N Ave Rio Bravo & Riverside Fwy (91 FWY)	165.5	298	369	489

Note: "a"= stream 1, "b" = stream 2, "c" = stream 3 in confluences
*=Slightly higher value used in XPSWMM model based on XP confluence calculation
~=Unit hydrograph flow
+=Upstream flow was used since downstream flow < upstream flow

6.2 Hydraulic Analysis

All of District 39 drains to the Santa Ana River. Therefore Method 1 was used of Sub-Section 2.2.3.1 where the water surface elevation was taken from the Santa Ana River Hydrologic Engineering Centers River Analysis System (HEC-RAS) model. Some storm drain lines drain to the Anaheim Hills Golf Course, which then drains to the Santa Ana River. For those areas draining to the golf course, Method 2 of Sub-Section 2.2.3.1 was used where the outlet was assumed to be free flowing. See Exhibit 4: District 39 Drainage Map for existing storm drain priorities. See Appendix B for Existing Conditions WSPG Hydraulic Models, Appendix C for Existing Conditions Prioritization Analyses, and Appendix F for Existing Conditions XPSWMM Hydraulic Model Results. Table 6-2 shows the summary of open channels and their velocities located within District 39 for the 10, 25, and 100-Year storm events.

Table 6-2: District 39 Open Channel Summary

Sub-district	Node	Location	Description of channel	10-Year Velocity	25-Year Velocity	100-Year Velocity
				(ft/s)	(ft/s)	(ft/s)
39-6	198351-192445	From north west corner of Anaheim Hills Golf Course to the intersection of E Canyon Rim Rd and Nohl Ranch Rd	Concrete lined 14' x 5' Trapezoidal channel with 1.5:1 side slopes	16.81	20.52*	27.48*
39-7	192445-192236	On Nohl Ranch Rd from the intersection with E Canyon Rim Rd to the intersection with Anaheim Hills Rd	Concrete lined 18' x 6' Trapezoidal channel with 1.5:1 side slopes	15.13	16.10	17.45
39-8	192236-191429	On Nohl Ranch Rd from the intersection with Anaheim Hills Rd to just east of S Hillcrest St	Concrete lined 12.5' x 4.5' Trapezoidal channel with 1.5:1 side slopes	19.42	24.38	32.72

39-8	191429-191216	On Nohl Ranch Rd from just east of S Hillcrest St to the intersection with E Santa Ana Canyon Rd	Concrete lined 12.5' x 4.5' Trapezoidal channel with 1.5:1 side slopes	19.60	24.60*	33.02*
39-12	191214-190406	East of N Avenida Palmera and west of N Camino Arroyo and south of E Camino Manzano and north ofE Camino Correr	Concrete lined 8' x 8' Trapezoidal channel with 1.5:1 side slopes	13.43	16.80	22.72*
39-16	196203-196102	North of E Calle Granada, south of the 91 Fwy and west of N Ave Malaga	Concrete lined 6' x 4' Trapezoidal channel with 1.5:1 side slopes	6.01	6.40	6.93

Note: * represents velocities greater than 20 cfs

For the concrete lined channels, velocities less than 20 feet per second are insignificant. Concrete channels with velocities greater than 20 feet per second have a potential for concrete failure. This information is provided for information purposes only. There are no recommendations to improve open channels at this time.

Sub-district 39-1 encompasses East Columbus Drive and South Lake Summit Dive and contains two existing storm drains ranging from 24-inches to 54-inches. The first storm drain originates at the very north end of East Columbus Drive and runs southwest, turns north on South Lake Summit Dive before taking a sharp left just south of East Shorecrest Drive, outletting to the Anaheim Hills Golf course. The second storm drain begins at the western intersection of East Via El Estribo and East Avenida De Santiago, runs east along East Avenida De Santiago, north along South Hidden Canyon Road and west on Serrano Avenue before running north between East Rudgers Drive and South Park Rim Circle and outletting to the Anaheim Hills Golf Course. The flow from both of these storm drains join the mainline in Sub-district 39-6 after flowing through the golf course and eventually drain to the Santa Ana River. Based on the XPWSPG, there was potential flooding throughout both storm drain lines but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-2 encompasses East Kentucky Avenue and Swarthmore Drive and contains an existing storm drain ranging from 6-inches to 42-inches. The storm drain originates at the Sub-district 32-1 storm drain and runs east along Coronado Street, before heading north on Van Buren Street. This system is located in the upstream area of district 39 which has steeper slopes than the downstream area. In addition, the system is relatively small and outlets to the Anaheim Golf Course, which is not an area of concern and has a large capacity for flow. For these reasons, this storm drain was not analyzed in XPSWMM. The flow from this storm drain joins the mainline in Sub-district 39-6 after flowing through the golf course and eventually drains to the Santa Ana River.

Sub-district 39-3 encompasses South Calle Venado and contains an existing storm drain ranging from 18-inches to 48-inches. The storm drain begins at the intersection of Leafwood Drive and South Rimwood Drive then follows north along South Rimwood Drive, west on Serrano Avenue, and north on South Calle Venado before turning northeast at the intersection of South Calle Venado and East Edinboro Circle and outletting in the Anaheim Hills Golf Course. Based on the XPWSPG, there was potential flooding at the system headworks and the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is deficient. The depth of flow exceeds the top of curb in the 25-year storm event on Serrano Avenue, making the system a Priority 1, and the flow exceeds the right of way in the 100-year storm event on South Calle Venado, making it a Priority 2.

Though the 25-year flood protection levels were exceeded, the 100-year protection levels are still met. The existing storm drain has an average capacity of 162 cfs, which is equivalent to 65 % of a 10-year storm. The flow from this storm drain joins the mainline in Sub-district 39-6 after flowing through the golf course and eventually drains to the Santa Ana River.

Sub-district 39-4 encompasses Camino Grande, Walnut Canyon Reservoir and a portion of East Country Club Lane and contains two small existing storm drain ranging from 21-inches to 30-inches. The first storm drain originates on Camino Grande just south of the intersection with Paseo Goya and runs north along Camino Grande to the corner of Camino Grande and East Camino Vista, before outletting to the Anaheim Hills Golf Course. The second storm drain begins on East Country Club Lane at the intersection with East Blackbird Lane and follows East Country Club Lane south until it also outlets to the Anaheim Hills Golf Course. These systems are located in the upstream area of district 39 which has steeper slopes than the downstream area. In addition, the systems are small and outlet to the Anaheim Golf Course, which is not an area of concern and has a large capacity for flow. For these reasons, these storm drains were not analyzed in XPSWMM. The flow from these storm drains join the mainline in Sub-district 39-6 after flowing through the golf course and eventually drain to the Santa Ana River.

Sub-district 39-5 encompasses Nohl Ranch Road and contains an existing storm drain ranging from 18-inches to 57-inches. The storm drain begins at the intersection of Nohl Ranch Road and Sky Gate Lane then follows north along Nohl Ranch Road before crossing Nohl Ranch Road north of the intersection with Via Encina and outletting in the Anaheim Hills Golf Course. Based on the XPWSPG, there was potential flooding at the system headworks but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient. In addition to the mainline in Sub-district 39-5, there is also a small system that encompasses South Highland Lane that ranges from 24-inches to 33-inches. This system picks up flow from East Lookout Lane and South Highland Lane and discharges to the Anaheim Hills Golf Course. Due to the small size and outlet location, this system was not analyzed in XPWSPG. The flow from this storm drain joins the mainline in Sub-district 39-6 after flowing through the golf course and eventually drain to the Santa Ana River.

Sub-district 39-6 encompasses Stage Coach Road and a portion of Nohl Ranch Road and contains an existing storm drain ranging from 24-inches to a 14' x 5' concrete lined trapezoidal channel. The storm drain begins at the intersection of Camino Grande and South Amber Lane then follows north along Camino Grand and Stage Coach Road, crosses Nohl Ranch Road and joins a 14' x 5' concrete lined trapezoidal channel that continues to Sub-district 39-7 before eventually discharging to the Santa Ana River. Based on the XPWSPG, there was potential flooding throughout the storm drain but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-7 encompasses East Canyon Rim Road and contains an existing storm drain system ranging from 27-inches to 30-inches. The storm drain begins on Via Corral just south of the intersection of East Canyon Rim Road and East Calle Del Norte then follows west along East Canyon Rim Road before confluencing with the mainline at the intersection with Nohl Ranch Road and continuing north. Sub-district 39-7 is directly tributary to Sub-district 39-8. Since this system is a lateral to the mainline and small in size, it was not analyzed in XPWSPG.

Sub-district 39-8 encompasses an existing storm drain system ranging from a double 10' x 8' RCB to a 12.5' x 4.5' concrete lined trapezoidal channel that runs north between Anaheim Hills Road and South Hillcrest Street. This system starts where Sub-district 39-7 ends at the intersection of South Anaheim Hills Road and Nohl Ranch Road before continuing north to the intersection of Anaheim Hills Road and Santa Ana Canyon Road where it confluences with two storm drain laterals in Sub-districts 39-9 and 39-10. Sub-district 39-8 is directly tributary to Sub-district 39-12. Based on the XPWSPG, there was potential

flooding throughout the storm drain but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-9 encompasses East Arboretum Road and South Quintana Drive and contains an existing storm drain system ranging from 6-inches to 75-inches. The storm drain begins at the intersection of South Quintana Drive and South Hidden Grove Lane, follows South Quintana Drive north and turns east on East Arboretum Road before confluencing with the mainline system from Sub-district 39-8 on Anaheim Hills Road and continuing north to Sub-district 39-11. To simplify the model, only the portion of storm drain with a diameter greater that 36-inches was modeled in XPSWMM. This portion began on East Arboretum Road at the intersection of South Bonnie Gene Lane. Based on the XPWSPG, there was potential flooding. Due to the high volume of flow going into the pipe in XPSWMM, there was a peak before stabilization which caused unrealistic depth of flow in the street for one reach of storm drain line, resulting in a priority 2 deficiency. Therefore, an additional deficiency analysis was completed assuming that the pipe flows at capacity and the remainder is on the street. This analysis was more conservative because the capacity calculations do not take into consideration the fact that the HGL can be within the ground and assumes any flow not in the pipe is on the street. Using the conservative method, there were no deficiencies in the system.

Sub-district 39-10 encompasses South Leandro Street and contains an existing storm drain system ranging from 21-inches to 48-inches. The storm drain begins at the intersection of South Leandro Street and East Marsha Circle, follows South Leandro Street north until turning east just north of East Prado Street and confluencing with the mainline system from Sub-district 39-8 on Anaheim Hills Road and continuing north to Sub-district 39-11. To simplify the model, only the portion of storm drain with a diameter greater that 36-inches was modeled in XPSWMM. This portion began on South Leandro Street at the intersection with East Constantine Road. Based on the XPWSPG, there was potential flooding but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-11 encompasses East Baja Drive as well as portions of East Santa Ana Canyon Road and South Quintana Drive and contains an existing storm drain system ranging from 15-inches to 54-inches. The storm drain begins at the intersection of Calle Jaime and South Avenue Lysanne then follows Santa Ana Canyon Road east before confluencing with the mainline at the intersection of Anaheim Hills Road and Santa Ana Canyon Road and continuing north. Sub-district 39-11 is directly tributary to Sub-district 39-12. Based on the XPWSPG, there was potential flooding. Due to instabilities caused by the short length of a few links in XPSWMM, there was a peak before stabilization which caused unrealistic depth of flow in the street for one reach of storm drain line, resulting in priority 3 deficiencies. Therefore, an additional deficiency analysis was completed assuming that the pipe flows at capacity and the remainder is on the street. This analysis was more conservative because the capacity calculations do not take into consideration the fact that the HGL can be within the ground and assumes any flow not in the pipe is on the street. Using the conservative method, there were no deficiencies in the system.

Sub-district 39-12 encompasses North Circulo Robel and East Calle Pantano and contains an existing storm drain system ranging from 30-inches to 60-inches as well as the 8' x 8' mainline concrete lined trapezoidal channel that runs north along Anaheim Hills Road before crossing SR-91 and outletting to the Santa Ana River. The other storm drain system has two system headworks. The first begins at the northwest corner of Eucalyptus Park, follows Paseo Rio Blanco north and East Camino Manzano west before joining the second storm drain line at the intersection with North Camino Arroyo and confluencing with the mainline. The second system headworks begins at the intersection of East Calle Pantano and North Avenida Barca, follows North Camino Arroyo, and joins the first storm drain line to outlet in the Santa Ana River. Based on the XPWSPG, there was potential flooding but the XPSWMM

deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-13 encompasses South Heath Terrace and the Big Lots Plaza on the corner of South Fairmont Boulevard and East Santa Ana Canyon Road. The sub-district contains a storm drain system ranging from 24-inches to 66-inches. Sub-district 39-13 is tributary to 39-16 and eventually drains to the Santa Ana River. The storm drain begins on East Calle Del Norte, travels north, perpendicular to Via Estrada, before continuing north on South Heath Terrace and the parking lot of Big Lots, turning east on East Santa Ana Canyon Road and confluencing with the system mainline in at the intersection of East Santa Ana Canyon Road and South Fairmont Boulevard before continuing through Sub-district 39-16. Based on the XPWSPG, there was potential flooding and the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is deficient, with the flow exceeding the right of way in the 100-year storm event, making it a priority 2. The deficiency occurs on South Heath Terrace, just south of East Rio Grande Drive. The existing storm drain has a capacity of 198 cfs, which is equivalent to 83 % of a 10-year storm.

Sub-district 39-14 encompasses South Fairmont Boulevard and South Willowcreek Lane and contains an existing storm drain system ranging from 18-inches to 45-inches. Sub-district 39-14 is tributary to 39-17 and eventually drains to the Santa Ana River. The storm drain starts on South Freemont Boulevard just west of Country Side Road, follows South Freemont Boulevard and South Willowcreek Lane north, through the back of the Canyon Hills Presbyterian Church and the plaza on the corner of East Santa Ana Canyon Road and South Fairmont Boulevard before turning west, joining with the Sub-district 39-17 storm drain line where it confluences with the mainline to continue through the 39-16 Sub-district. Based on the XPWSPG, there was potential flooding but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-15 encompasses South Old Bridge Road and contains an existing storm drain system ranging from 18-inches to 66-inches. Sub-district 39-15 is tributary to 39-17 and eventually drains to the Santa Ana River. The storm drain starts on South Country Hill Road just west of South Vista Real Way, crosses over to South Old Bridge Road and continues north before crossing El Rancho Charter School, where it confluences with the mainline to continue through the 39-16 Sub-district. Based on the XPWSPG, there was potential flooding but the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is not deficient.

Sub-district 39-16 encompasses North Avenue Malaga and East Camino Tampico and contains two existing storm drain systems ranging from 48-inches to 90-inches as well as a concrete lined 6' x 4' trapezoidal channel. Sub-districts 39-13, 39-14, and 39-15 are tributary to 39-17 and 39-17 is directly tributary to 39-16 and drains to the Santa Ana River. The mainline storm drain continues from Sub-district 39-17 and runs north on Fairmont Boulevard before crossing SR-91 and discharging to the Santa Ana River. The other storm drain begins on North Avenue Rio Bravo at the intersection with East Camino Tampico, turns west on East Calle Granada where a portion of the line runs along the street before crossing north and continuing west as a 6' x 4' trapezoidal channel to confluence with the mainline, where it finally crosses SR-91 and outlets to the Santa Ana River. Based on the XPWSPG, there was potential flooding and the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is deficient, with the flow exceeding the top of curb in the 10-year storm event, making it a Priority 1. Though the 10-year flood protection levels were exceeded, the 100-year protection levels were still met. The deficiencies occur on East Calle Granada before the transition to the 6' x 4' trapezoidal channel. The existing storm drain has an average capacity of 168 cfs, which is equivalent to 195 % of a 10-year storm.

Sub-district 39-17 encompasses South Mohler Drive and contains an existing storm drain system ranging from 18-inches to a double 48-inch RCP. The storm drain begins at the intersection of South Mohler Drive and South County Hills Road, follows South Mohler Drive and South Del Giorgio Road north to East Santa Ana Canyon Road where it continues east, then north along North Avenue Rio Bravo before crossing SR-91 and discharges to the Santa Ana River. Although the storm drain conveys flow along North Avenue Rio Bravo, there is no flow picked up after crossing East Santa Ana Canyon Road. There are a few laterals branching off of the mainline storm drain system. Due to their small size (less than 36-inches), only the mainline was analyzed in XPSWMM. Based on the XPWSPG, there was potential flooding and the XPSWMM deficiency analysis discussed in sub-sections 2.2.3.2 and 2.2.3.3 showed that the storm drain is deficient, with the flow exceeding the top of curb in the 10-year storm event, making it a Priority 1. Though the 10-year flood protection levels were exceeded, the 100-year protection levels were still met. The deficiencies occur on North Avenue Rio Bravo between East Paseo Laredo and East Calle Durango as well as at the intersection with East Calle Granada. The existing storm drain has an average capacity of 106 cfs, which is equivalent to 36 % of a 10-year storm. The downstream end of the system ties in to an 8' x 6' RCB Caltrans facility, which is undersized. Therefore, prior to improving the City's storm drain system, it is recommended that the downstream Caltrans system be upsized.

6.2.1 Non-City Storm Drainage System

The natural undeveloped area at the most upstream end of District 39 that drains south to Weir Canyon was not analyzed as the flow runs out of the city boundary and is not collected by a city storm drain.

6.3 Recommended Capital Improvements

The entire District 39 eventually drains to the Santa Ana River and according to Section 1 – Revisions, Deletions and Additions of Drainage Manual for Public and Private Drainage Facilities, City of Anaheim August 2005, the minimum recurrence interval for the design of new local drainage facilities shall be a 25-year storm event for all open and underground channels and storm drains with drainage areas less than 640 acres, and tributary to the Santa Ana River Watershed. Therefore, the proposed systems within District 39 have been designed for the 25-year storm event.

6.3.1 Alternatives Analysis

The 48-inch storm drain system that receives flow from Sub-district 39-3 is deficient with priority 1 and priority 2 deficiencies. The deficient system is located on Serrano Avenue and South Calle Venado. Due to the residential land use upstream of and surrounding the deficient storm drain, there is no ideal location to implement a detention basin to reduce the flow. Therefore, a pipe replacement or addition of a parallel pipe is recommended for this system. This system is shown as "AA# 5" on Figure 6-1.

The 42-inch storm drain system that receives flow from Sub-district 39-13 is deficient with a priority 2 deficiency. The deficient system is located on South Health Terrace just south of the intersection with East Rio Grande Drive. There is a small natural area to the west of the deficient storm drain, however due to the steep grade, and small area, a pipe replacement or addition of a parallel pipe is recommended for this system. This system is shown as "AA# 6" on Figure 6-2.

The 48-inch storm drain system that receives flow from Sub-district 39-16 is deficient with priority 1 and priority 2 deficiencies. The deficient system is located on East Calle Granada. Due to the residential land use upstream of and surrounding the deficient storm drain, there is no ideal location to implement a detention basin to reduce the flow. Therefore, a pipe replacement or addition of a parallel pipe is recommended for this system. This system is shown as "AA# 7" on Figure 6-3.

The double 48-inch storm drain system that receives flow from Sub-district 37-17 is deficient in two locations with priority 1 and priority 2 deficiencies. The first section of deficient storm drain is located on Avenida Rio Bravo from just the intersection with E Calle Granada until just before the storm drain crosses SR-91. The second section of deficient storm drain is on Avenida Rio Bravo between the intersections of E Calle Durango and E Paseo Laredo. A basin could be placed in the open space located approximately 250 feet east of Del Giorgio Road on Santa Ana Canyon Road. This area is currently being used for agricultural purposes. The addition of a basin may alleviate the downstream flooding. If this location is not available for use, there is another location option in the north east corner of the El Rancho Charter School sports field. This would be a little more upstream from the deficient system but would reduce the flows and may alleviate the downstream flooding. Other alternatives would be to increase the storm drain size via replacement, or add a parallel storm drain to allow the system to handle the flow. This system is shown as "AA# 8" on Figure 6-4.

Table 6-3 is a summary of the calculated proposed systems for each sub-district within District 39. See Figure 6-1, Figure 6-2, and Figure 6-3 for information corresponding to the Table 6-3 and Appendix D for the Proposed Conditions Street Flow Analyses.

Table 6-3: District 39 Proposed Improvements

Replacement Pipe		Parallel Pipe		Street Names	Notes
Pipe Size (in)	Length (ft)	Pipe Size (in)	Length (ft)		
Sub-district 39-1					
					No proposed system.
Sub-district 39-2					
					No proposed system.
Sub-district 39-3					
66	1304	54	1304	S Calle Venado, Serrano Ave	
78	96	66	96		
Sub-district 39-4					
					No proposed system.
Sub-district 39-5					
					No proposed system.
Sub-district 39-6					
					No proposed system.
Sub-district 39-7					
					No proposed system.
Sub-district 39-8					
					No proposed system.
Sub-district 39-9					
					No proposed system.
Sub-district 39-10					
					No proposed system.

Replacement Pipe		Parallel Pipe		Street Names	Notes
Pipe Size	Length	Pipe Size	Length		
(in)	(ft)	(in)	(ft)		
Sub-district 39-11					
					No proposed system.
Sub-district 39-12					
					No proposed system.
Sub-district 39-13					
54	567	36	567	S Heath Terrace	
60	194	42	194		
Sub-district 39-14					
					No proposed system.
Sub-district 39-15					
					No proposed system.
Sub-district 39-16					
60	630	48	630	E Calle Granada	
Sub-district 39-17					
102	1180	90	1180	N Ave Rio Bravo	

6.4 Cost Estimates

For each system, a recommendation is provided for the type of proposed system: replacement versus parallel. Table 6-4 gives a summary of the construction cost estimates and the recommended system. See Appendix E for Detailed Cost Estimates.

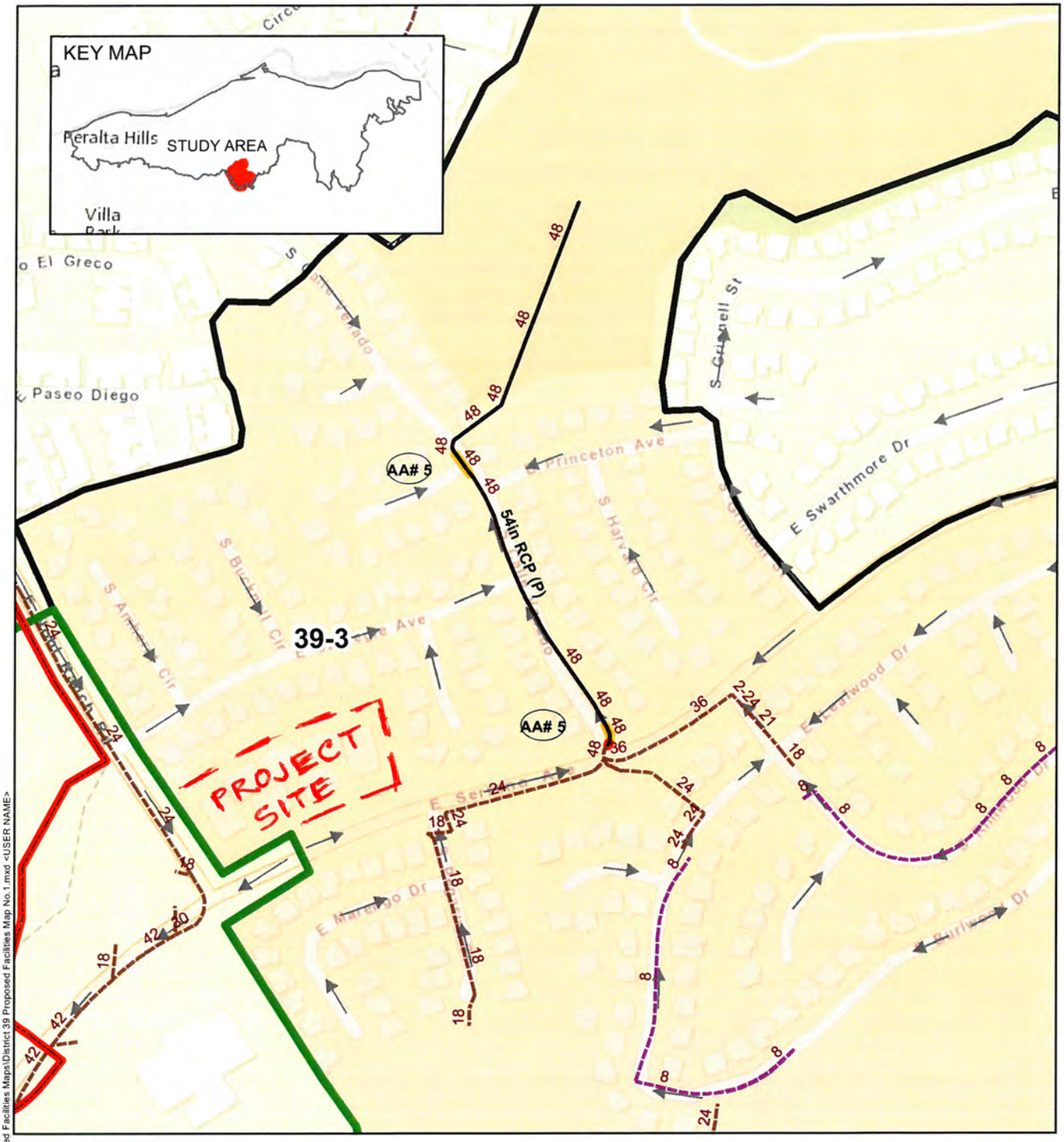
Table 6-4: District 39 Cost Estimate Summary

Sub-district	Existing Pipe Size (in)	Recommended System			Total Project Cost	Street Name	Notes
		(R or P)	Proposed Pipe Sizes (in)	Proposed Pipe Length (ft)	(2017 $)		
39-1	-	-	-	-	$0	-	No proposed storm drain.
39-2	-	-	-	-	$0	-	No proposed storm drain.
39-3	48	P	54-66	1400	$2,799,000	S Calle Venado, Serrano Ave	Cost savings of $779,000*
39-4	-	-	-	-	$0	-	No proposed storm drain.
39-5	-	-	-	-	$0	-	No proposed storm drain.
39-6	-	-	-	-	$0	-	No proposed storm drain.
39-7	-	-	-	-	$0	-	No proposed storm drain.
39-8	-	-	-	-	$0	-	No proposed storm drain.
39-9	-	-	-	-	$0	-	No proposed storm drain.
39-10	-	-	-	-	$0	-	No proposed storm drain.
39-11	-	-	-	-	$0	-	No proposed storm drain.
39-12	-	-	-	-	$0	-	No proposed storm drain.
39-13	42-48	P	36-42	761	$705,000	S Heath Terrace	Cost savings of $922,000*
39-14	-	-	-	-	$0	-	No proposed storm drain.
39-15	-	-	-	-	$0	-	No proposed storm drain.
39-16	48	P	48	630	$1,078,000	E Calle Granada	Cost savings of $411,000*
39-17	2-48	R	102	1180	$4,748,000	N Avenue Rio Bravo	Insufficient room for the parallel system. Requires improvements to downstream Caltrans facility.
Total System Cost					$9,330,000		

Note: P = Parallel System, R = Replacement System, "-" = No Proposed System

*When compared to the Replacement System Option

**When compared to the Parallel System Option



Legend

- CityBoundary
- FlowArrows
- **37-6** Drainage Area
- **36in RCP** Proposed Pipe Size
- Proposed Storm Drain
- District Boundary

Deficient Storm Drain System

- Priority 1
- Priority 2

Existing Storm Drains

- Anaheim
- County
- Caltrans
- Onsite Private
- Private

(R) Proposed Replacement System

(P) Proposed Parallel System

0 125 250 500 Feet

Source: Esri

Michael Baker INTERNATIONAL

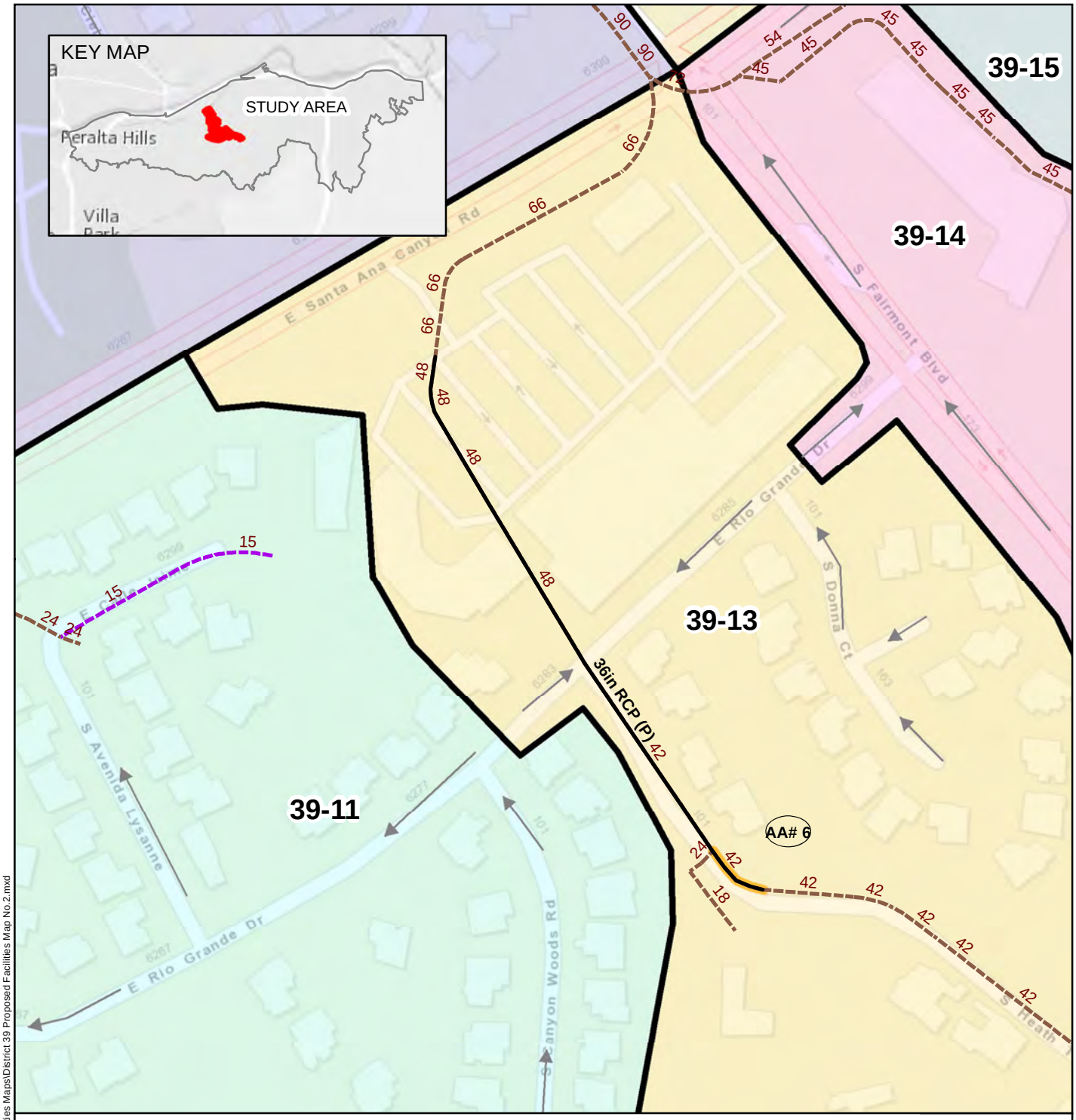
Master Plan of Storm Drainage for
South & East Santa Ana River Tributary Area

District 39

Sub-District: 39-3

Figure 6-1: District 39 Proposed Facility Map No. 1

6/13/2017 JN M:\Mdata\148726\GIS\MXD\Proposed Facilities Maps\District 39 Proposed Facilities Map No.1.mxd <USER NAME>



Legend

- CityBoundary
- FlowArrows
- **37-6** Drainage Area
- **36in RCP** Proposed Pipe Size
- Proposed Storm Drain
- District Boundary

Deficient Storm Drain System

- Priority 1
- Priority 2

Existing Storm Drains

- Anaheim
- County
- Caltrans
- Onsite Private
- Private

(R) Proposed Replacement System

(P) Proposed Parallel System

Michael Baker INTERNATIONAL

0 125 250 500 Feet

Source: Esri

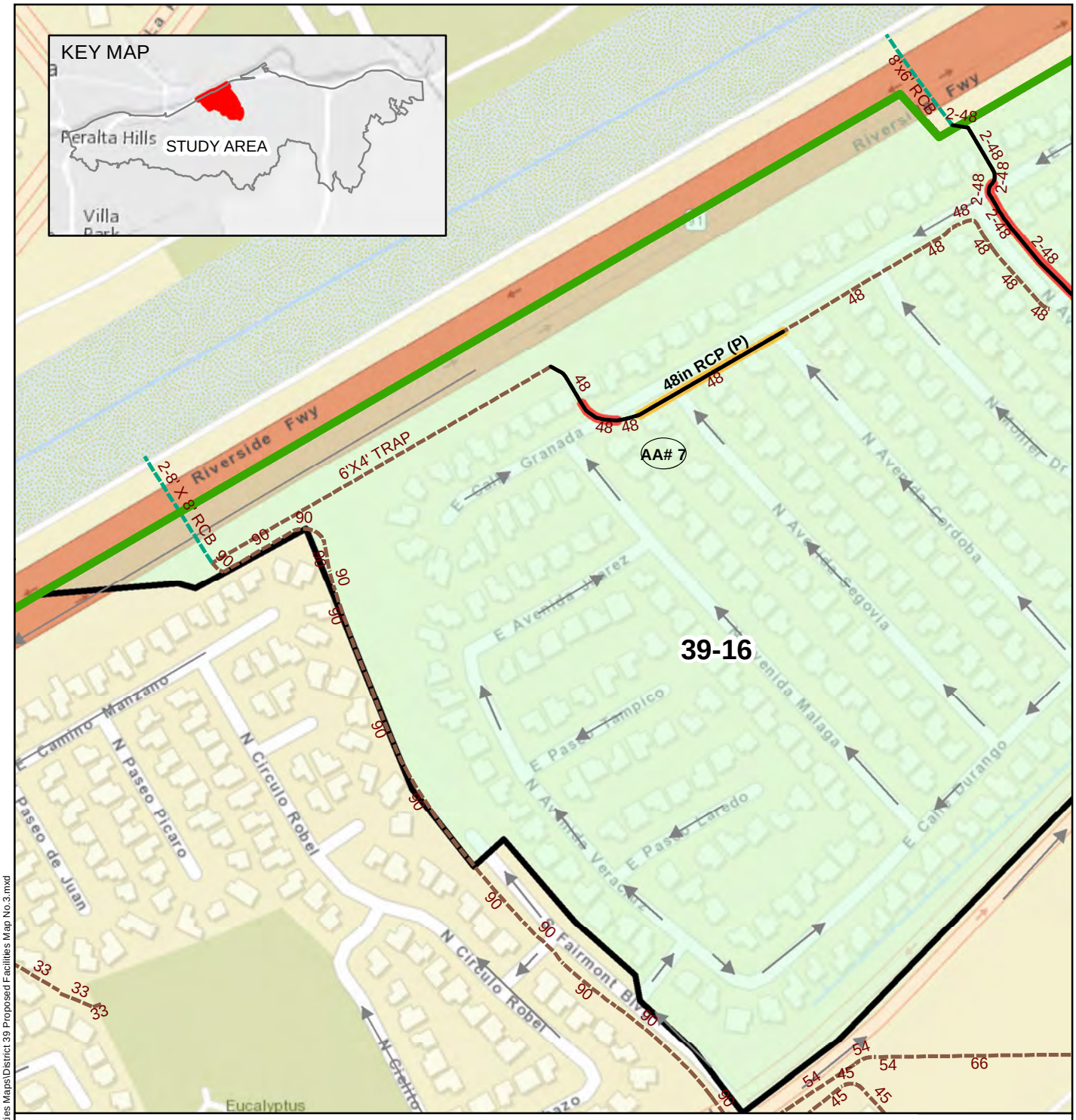
Master Plan of Storm Drainage for
South & East Santa Ana River Tributary Area

District 39

Sub-District: 39-13

Figure 6-2: District 39 Proposed Facility Map No. 2

6/13/2017 JN M:\Mdata\148726\GIS\MXD\Proposed Facilities Maps\District 39 Proposed Facilities Map No.2.mxd



Legend

- CityBoundary
- FlowArrows
- **37-6** Drainage Area
- **36in RCP** Proposed Pipe Size
- Proposed Storm Drain
- District Boundary

Deficient Storm Drain System

- Priority 1
- Priority 2

Existing Storm Drains

- Anaheim
- County
- Caltrans
- Onsite Private
- Private

(R) Proposed Replacement System

(P) Proposed Parallel System

Michael Baker INTERNATIONAL

0 125 250 500 Feet

Source: Esri

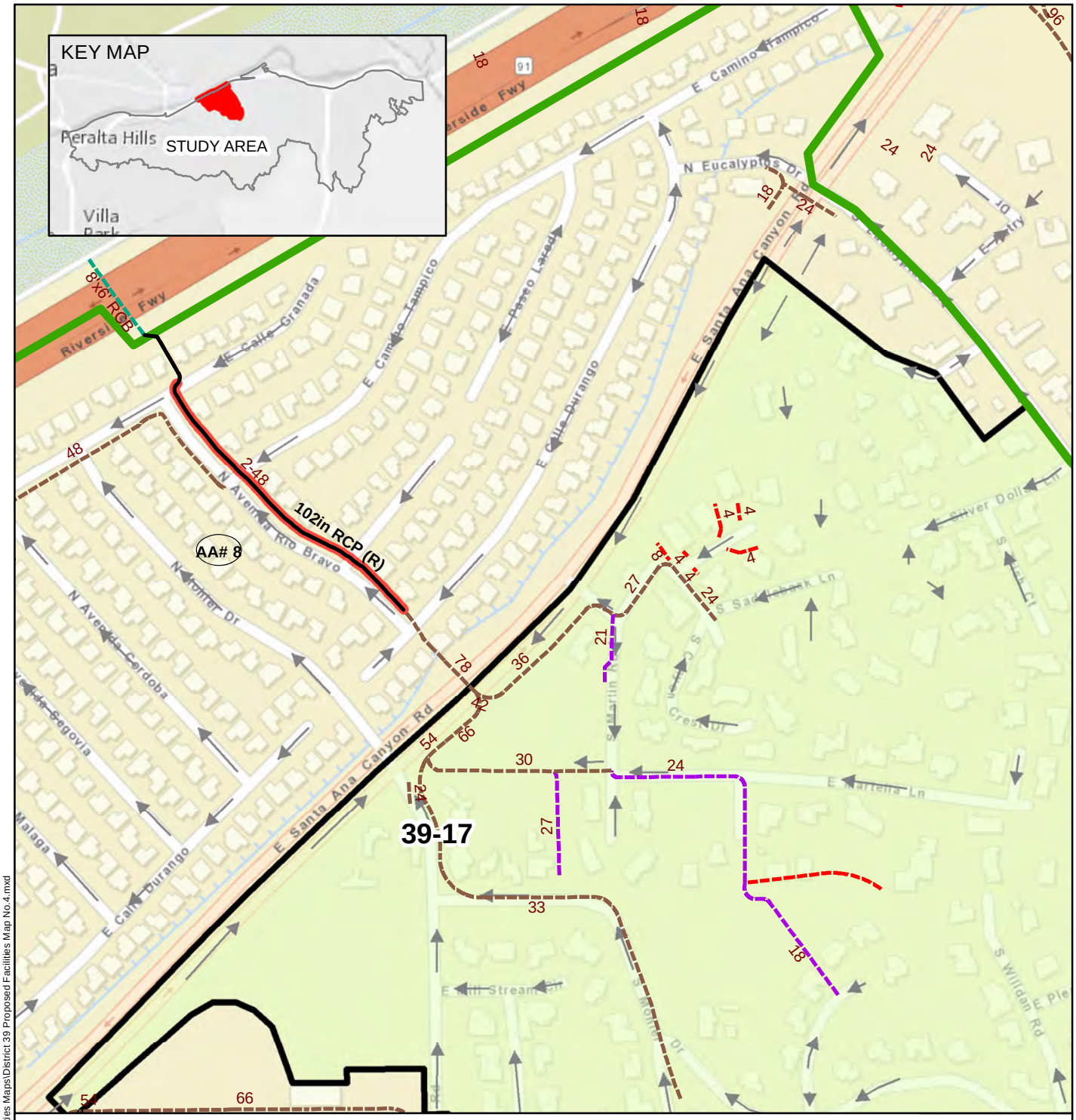
Master Plan of Storm Drainage for
South & East Santa Ana River Tributary Area

District 39

Sub-District: 39-16

Figure 6-3: District 39 Proposed Facility Map No. 3

6/13/2017 JN M:\Mdata\148726\GIS\MXD\Proposed Facilities Maps\District 39 Proposed Facilities Map No.3.mxd



Legend

- CityBoundary
- FlowArrows
- Drainage Area
- 37-6 Proposed Pipe Size
- 36in RCP Proposed Storm Drain
- District Boundary

Deficient Storm Drain System

- Priority 1
- Priority 2

Existing Storm Drains

- Anaheim
- County
- Caltrans
- Onsite Private
- Private

- (R) Proposed Replacement System
- (P) Proposed Parallel System

Michael Baker INTERNATIONAL

0 125 250 500 Feet

Source: Esri

Master Plan of Storm Drainage for
South & East Santa Ana River Tributary Area

District 39

Sub-District: 39-17

Figure 6-4: District 39 Proposed Facility Map No. 4

6/13/2017 JN M:\Mdata\148726\GIS\MXD\Proposed Facilities Maps\District 39 Proposed Facilities Map No.4.mxd

HUNSAKER
& ASSOCIATES
IRVINE, INC.

PLANNING
ENGINEERING
SURVEYING
GOVERNMENT RELATIONS

IRVINE
LOS ANGELES
PALM DESERT
RIVERSIDE
SAN DIEGO

April 15, 2019

Mr. Edgar Garcia
Associate Engineer
CITY OF ANAHEIM
200 S. Anaheim Boulevard, 1st Floor
Anaheim, CA 92805

Subject: **Review of Conceptual Hydrology Report for TTM 18104, Nohl Condos, OTH2017-00980, Northeast corner of Serrano Ave. and Nohl Ranch Rd. – Fourth Review – Response to Comments**

Dear Edgar:

We have received the comments on the above referenced project, dated April 1, 2019. We have listed the comments in the order received followed by our response in bold text.

PRINCIPALS:
FRED GRAYLEE
BRADLEY HAY
PAUL HUDDLESTON
KAMAL KARAM
DOUGLAS STALEY
KRIS WEBER
JOSEPH E. WIGHTMAN

3. Hydrology Report

3.1. Rerouting of on-site flows are consistent with the long term goal of the Master Plan of Drainage for South & East Santa Ana River Tributary Areas (District 39-3). However, at interim condition, developed on-site flows need to be limited to existing condition flows (of 7.3 cfs) at the easterly project entrance to not impact existing public storm drain system. Please provide on-site detention to limit flows at interim.

A flow-by detention basin is proposed at node 4.1 to limit the 25-year storm runoff to the existing level of 7.3 cfs. The exact location, type, and configuration of the detention basin, diversion structure, and connector pipe shall be determined in the final design.

3.2 The ponding exhibit shall demonstrate that the lowest GFF shall be higher than the water surface elevation of the 100-year event.

The lowest GFF has been revised to be higher than the 100-year water surface elevation.

3.3 Please see and addresses all other redlines comments as noted on hydrology report.

All other redlines comments have been addressed.

Should you have any questions please do not hesitate to call me at (949) 768-2528.

Sincerely,

HUNSAKER & ASSOCIATES IRVINE, INC.

Tu Trinh
Project Engineer

TT:tl
W.O. 4198-1 (f\c\wo\4198\1 L03-tt.docx)

FOUNDING PARTNERS:
RICHARD HUNSAKER
TOM R. McGANNON
JOHN A. MICHLER
DOUGLAS G. SNYDER

Three Hughes
Irvine, California
92618-2021
(949) 583-1010 PH
(949) 583-0759 FX
www.hunsaker.com

City of Anaheim
DEPARTMENT OF PUBLIC WORKS

April 1, 2019

To: Tu Trinh, P.E.
Hunsaker & Associates
Three Hughes
Irvine, CA 92618
Tel: 949-583-1010

RE: Review of Conceptual Hydrology Report for TTM 18104, Nohl Condos, OTH2017-00980, Northeast corner of Serrano Ave. and Nohl Ranch Rd.
Fourth Review

Dear Mr. Trinh:
We have completed our review of this project and a re-submittal is required. The following will be required for the next plan submittal:

1. This Hydrology Report markup print and a copy of this letter.
2. Two (2) prints of corrected reports addressing all corrections on the check print and/or on a typewritten response letter.
3. *Hydrology Report*
   - 3.1 Rerouting of on-site flows are consistent with the long term goal of the Master Plan of Drainage for South & East Santa Ana River Tributary Areas (District 39-3). However, at interim condition, developed on-site flows need to be limited to existing condition flows (of 7.3 cfs) at the easterly project entrance to not impact existing public storm drain system. Please provide on-site detention to limit flows at interim.
   - 3.2 The ponding exhibit shall demonstrate that the lowest GFF shall be higher than the water surface elevation of the 100-year event.
   - 3.3 Please see and address all other redline comments as noted on hydrology report.

If you have any questions regarding this project, please contact Mostafa Komaee at (949) 502-2960 or at (949)910-6943 or Edgar Garcia at (714)765-4953 or at egarcia2@anaheim.net.

Sincerely,

Edgar Garcia
Associate Engineer

Attachments: Hydrology Report for OTH2017-00980, dated December 3, 2018

cc; Raul Garcia, Development Services Manager
Mike Eskander, Principal Civil Engineer
DSL Consulting, Inc., PO Box 51371, Irvine, CA 92619
File

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