19 Spectrum Pointe Drive
Suite 609
Lake Forest, CA 92630

PRELIMINARY HYDROLOGY & HYDRAULIC ANALYSIS

Tract 17944
City of Anaheim
Orange County
OTH2021-01330

DEPARTMENT OF PUBLIC WORKS
DEVELOPMENT SERVICES
APPROVED
WITH CONDITIONS
Cesar Morales, Associate Engineer
9/24/2021, 12:49:18 PM
ANAH-OTH2021-01330
Cesar Morales

Prepared Under the Supervision of:

Civil Engineer: Dru J. Mayers RCE 38474

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I. DRAINAGE OVERVIEW

1. INTRODUCTION

A. PURPOSE

The purpose of this report is to provide a hydrology analysis for use in the design of the drainage system for development of the proposed Tract Map 17944. This study will calculate the 25 & 100-year rational method storm discharges for the developed site. The analysis will also calculate 25 & 100 year storm in existing condition. Since the existing 30" RCP is inadequate to handle any additional storm water into it as described in the master drainage study. This report will show how we will capture and retain the 100-year storm flow onsite as to not adversely impact the existing storm drain system within Western Avenue and Ball Road.

B. PROJECT DESCRIPTION

Tract Map 17944 is located within Santa Ana river reach 1 in the City of Anaheim in County Orange. The site is a rectangular shaped East of 605 Freeway and North side of freeways 405 and 22 central portion of Orange County and is approximately 1.75 miles due south of Knott's Berry Farms. See the vicinity map contained in Section II of this report. FEMA Flood Map number 06059C01091.

C. EXISTING CONDITION

In the existing condition the majority of the site is pervious, consisting of a large concrete and an asphalt pavement driveway with a large pool located on the east side of the project vicinity occupying 17% of the total development site. The parking lot is relatively flat with an approximate slope of 0.5%. The undeveloped areas have an approximate slope of 0.5%. In the existing condition, the site drains southwest unmitigated to the Western Ave easterly curb and gutter and ultimately south to an existing storm drain catch basin downstream.

D. PROPOSED CONDITION

The project consists of the redevelopment of the existing site that currently consists of a large concrete pad, asphalt driveway, and landscape along the north and south edges of the site. The project proposes to construct 12 single family residential units, roads, hardscape improvements, landscape improvements, and permeable pavers for treatment. The hardscape improvements include a street design with associated sewer and water utilities. Landscape improvements includes vegetated areas around each individual residential property. Proposed stormdrain treatment for the project site consists of infiltration treatment via permeable pavement. The storm runoff will enter permeable pavement on the low side of the project via sheet flow. The proposed permeable pavement will not be connected to the City's existing Western Avenue 30" RCP storm drain in front of the development per the city of Anaheim's direction. The permeable pavement will be sized to hold the net flow of the 100 year storm and excess water will runoff the site onto Western Avenue in overflow conditions, never draining to the existing 30" RCP on Western Avenue. Once water leaves the site via curb and gutter on Western Avenue runoff will then gravity flow to an existing 63" RCP along Ball Road that drains into Carbon Creek Channel. According to the city of Anaheim Storm Drainage Master Plan dated September 2010, the Carbon Creek Channel joins Carbon Creek that empties into the Santa Ana River and ultimately ends at the Pacific Ocean.

2. METHODOLOGY

A. DISCUSSION

The methodology used in this report is based on the Orange County Hydrology Manual, Orange County Flood Control District Design Manual, Orange County Street Capacity and Inlet Design Aides Manual and the City of Anaheim Street Design Manual current editions. Refer to the Orange County Hydrology Manual for applicable formulas, variables and values used for assumptions and computations.

Advanced Engineering Software (AES) was used to complete the rational method calculations which follows the Orange County Hydrology Manual Standards.

The following criteria were used in this analysis:

- All available information and improvement plans were collected and applied to this study as applicable.
- The drainage areas within and tributary to the project site were defined. Drainage areas can be found in the next section under Rational Method Hydrology Analysis and under the Runoff Flows Summary Chart.
- Rational method was performed based on meeting the requirements for this specific analysis and AES was used to complete the rational method analysis.

The results of this study and the print out of these calculations for this hydrological analysis are presented herein.

3. RATIONAL HYDROLOGY ANALYSIS

A. GENERAL

The hydrologic studies prepared in this report utilized the rational method in accordance with the 1986 Orange County Hydrology Manual.

Hydrology calculations were prepared using the “Rational Method Analysis” by Advanced Engineering Software (AES) based on the hydrology manual criterion.

The rational method computes the peak runoff as a function of area, rainfall intensity, and a coefficient of runoff. The basic formula in the rational method is as follows:

Runoff Flow Calculations

$$Q = CIA$$

Where:

Q = Peak runoff in cubic feet per second (cfs)
C = Coefficient of runoff

I = Average rainfall in inches per hour corresponding to the time of concentration
A = Drainage area in acres

Runoff Volume Calculations

$$V = \frac{C*A*P_{24}}{12}$$

V = Volume in acre-ft.
C= Coefficient of Runoff
= 0.9 [Ai + ((I-Fp)/I)*Ap]

P_{24} = 24-hour storm rainfall AMC-II
F_p = = 0.3

A = Drainage area in acres

This formula computes the peak flow rate at all points of concentration. The hydrology analysis is provided in this report.

Finished surfaces of the completed development is a significant factor in the development of the hydrology study in that the coefficient of runoff used in the rational method are partially dependent upon the type of surface development proposed within the drainage area.

The major factor affecting onsite infiltration is the nature of the soil. Pursuant to the maps located in the TGD, the project site is located on type B soil and is not located in a potential landslide area. Refer to Exhibit A.

Soil Group B Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained sandy-loam soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Rainfall intensity is expressed in inches of rainfall per hour. The rainfall intensity data used in this study was obtained from the curves for mean precipitation intensities for non-mountainous areas (drainage areas below 2000 feet) included in the 1986 Orange County Hydrology Manual.

B. RATIONAL METHOD HYDROLOGY ANALYSIS

A rational method hydrology study has been prepared for the development of this site. This study will calculate the 25-year and 100-year storm discharges for the sizing of drainage facilities.

The flows generated from the proposed site are more than the existing conditions. A table of pre and post-construction flows can be seen in the table below.

RUNOFF FLOWS

Condition	Tributary Area (Acres)	25-Year Peak Flow Rate (CFS)	100-Year Peak Flow Rate (CFS)
Existing Condition (DMA-X)	(1.39)	(3.37)	(4.37)
Proposed Condition DMA-A	0.70	2.32	3.0
Proposed Condition DMA-B	0.69	2.29	2.95
Total	**(1.39) 1.39**	**(3.37) 4.61**	**(4.37) 5.95**
Post Construction Net Difference		**1.24**	**1.58**

RUNOFF VOLUMES

Table 2: Estimated Storm Runoff Volumes

Tributary Area	(DMA X)	DMA A	DMA B	Totals
Acreage (Post)	(1.39)	0.70	0.69	1.39 (1.39)
Curve Number	65	80	80	
25 year Pre- Development Volume; V_{25} (cfs)	0.35			(0.35)
25 year Post- Development Volume; V_{25} (cfs)		0.21	0.21	0.42
100 year Pre- Development Volume; V_{100} (cfs)	0.32			(0.32)
100 year Post- Development Volume; V_{100} (cfs)		0.28	0.28	0.56

The Rational Hydrology Analysis is contained in **Section III, Appendix A** of this report.

4. HYDRAULIC ANALYSIS

Using the calculated flow rates, WSPGW was used to determine if the existing Western Avenue storm drain and the upstream culvert junction is able to convey the 100 year storm. The results of the hydraulic calculations show the water elevations along the existing storm drain, culvert junction/transition and upstream swale for the existing and proposed conditions. The hydrologic analysis is contained in **Section III, Appendix B** of this report

II. VICINITY MAP

III. APPENDICES

APPENDIX A RATIONAL HYDROLOGY ANALYSIS
Drainage Calculation 25-yr & 100-yr

APPENDIX B RATIONAL METHOD RUNOFF VOLUME CALCULATIONS
Drainage Calculation 25-yr & 100-yr

APPENDIX C EXISTING 30” RCP ANALYSIS

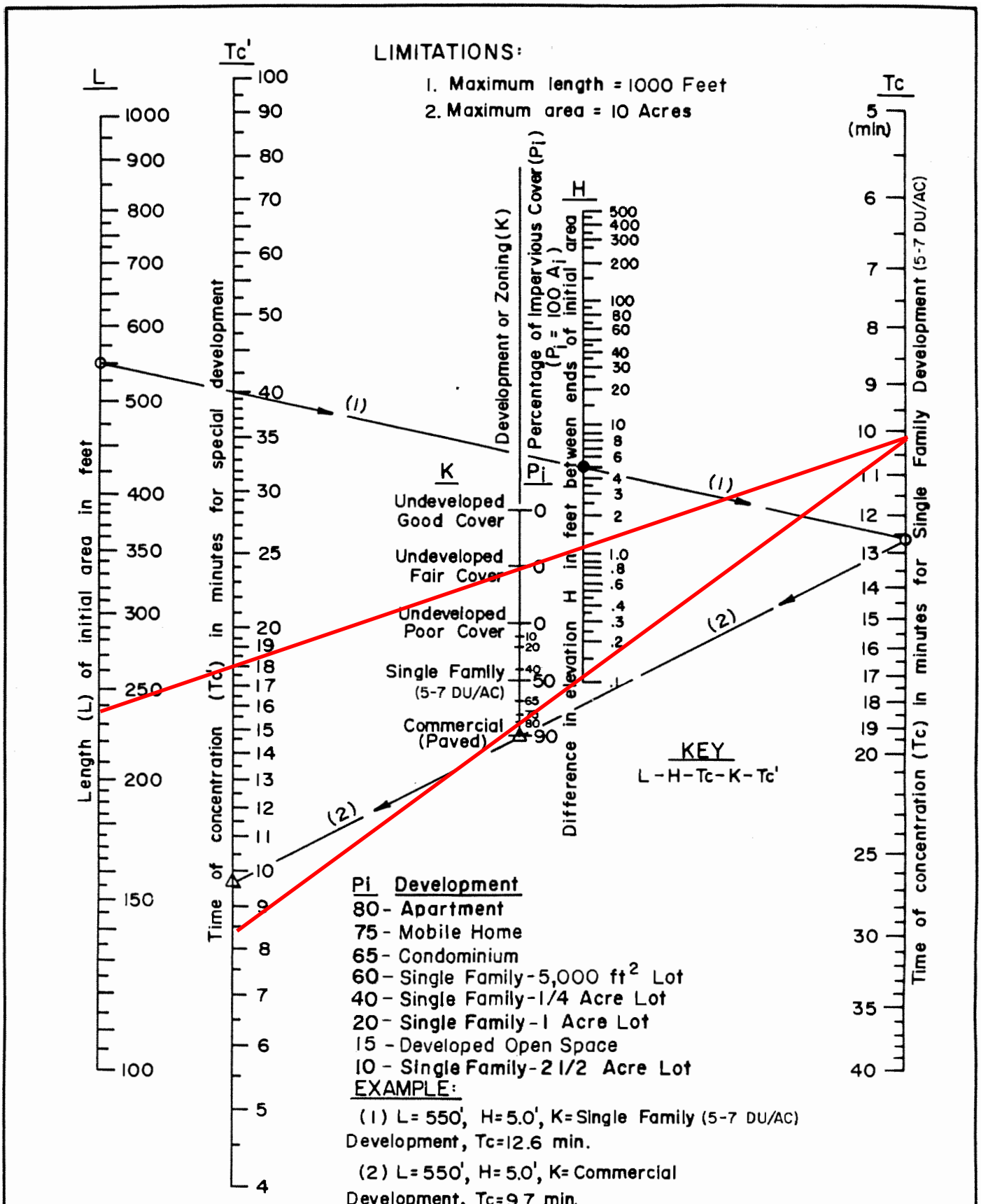
APPENDIX "A"

RATIONAL HYDROLOGY ANALYSIS

Existing Drainage Calculation 25-yr & 100-yr

Pre dev

Tc = 8.5 MIN



ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1472

                        Analysis prepared by:
```

TR 17944 ANAHEIM
25 YEAR STORM RATIONAL METHOD
EXISTING CONDITIONS

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  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.40
  *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

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==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =    8.50   RAINFALL INTENSITY(INCH/HR) =  3.57
  EFFECTIVE AREA(ACRES) =     1.39
  TOTAL AREA(ACRES) =     1.39        PEAK FLOW RATE(CFS) =      0.00
  AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap =  1.00
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  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

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============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =    8.50   RAINFALL INTENSITY(INCH/HR) =  3.57
  EFFECTIVE AREA(ACRES) =     1.39
  TOTAL AREA(ACRES) =     1.39        PEAK FLOW RATE(CFS) =      2.30
  AREA-AVERAGED Fm(INCH/HR) =   0.26  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap =  0.86
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

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  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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  ELEVATION DATA: UPSTREAM(FEET) =     65.30  DOWNSTREAM(FEET) =     64.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.058
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  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.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          B        1.39      0.30     0.800    36   12.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      3.37
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      3.37

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  TIME OF CONCENTRATION(MIN.) =   12.06
  RAINFALL INTENSITY(INCH/HR) =   2.93
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       1.39
  TOTAL STREAM AREA(ACRES) =       1.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.37

+----------------------------------------------------------------------------+
|                                                                            |
```

| 25 Year Storm Pre Development |
| Existing Condition |

```
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  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
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  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   238.00
  ELEVATION DATA: UPSTREAM(FEET) =     65.30  DOWNSTREAM(FEET) =     64.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.058
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  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.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          B        1.39      0.30     0.800    36   12.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      3.37
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      3.37
==========================================================================
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  EFFECTIVE AREA(ACRES) =      1.39  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.800
  PEAK FLOW RATE(CFS)   =       3.37
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
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**************************************************************************
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                        Analysis prepared by:
```

TR 17944 ANAHEIM
100 YEAR STORM RATIONAL METHOD
EXISTING CONDITIONS

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  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.40
  *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

**************************************************************************
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==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
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  TOTAL AREA(ACRES) =     1.39        PEAK FLOW RATE(CFS) =      0.00
  AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap =  1.00
```

```
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =    8.50   RAINFALL INTENSITY(INCH/HR) =  4.57
  EFFECTIVE AREA(ACRES) =     1.39
  TOTAL AREA(ACRES) =     1.39        PEAK FLOW RATE(CFS) =      2.30
  AREA-AVERAGED Fm(INCH/HR) =   0.26  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap =  0.86
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

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  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
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  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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  ELEVATION DATA: UPSTREAM(FEET) =     65.30  DOWNSTREAM(FEET) =     64.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.058
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.736
  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.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          B        1.39      0.30     0.800    36   12.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      4.37
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      4.37

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============================================================================
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  RAINFALL INTENSITY(INCH/HR) =   3.74
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       1.39
  TOTAL STREAM AREA(ACRES) =       1.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.37

+----------------------------------------------------------------------------+
|                                                                            |
```

| 100 Year Storm Pre Development |
| Existing Condition |

```
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  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   238.00
  ELEVATION DATA: UPSTREAM(FEET) =     65.30  DOWNSTREAM(FEET) =     64.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.058
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.736
  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.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          B        1.39      0.30     0.800    36   12.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      4.37
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      4.37
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     12.06
  EFFECTIVE AREA(ACRES) =      1.39  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.800
  PEAK FLOW RATE(CFS)   =       4.37
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
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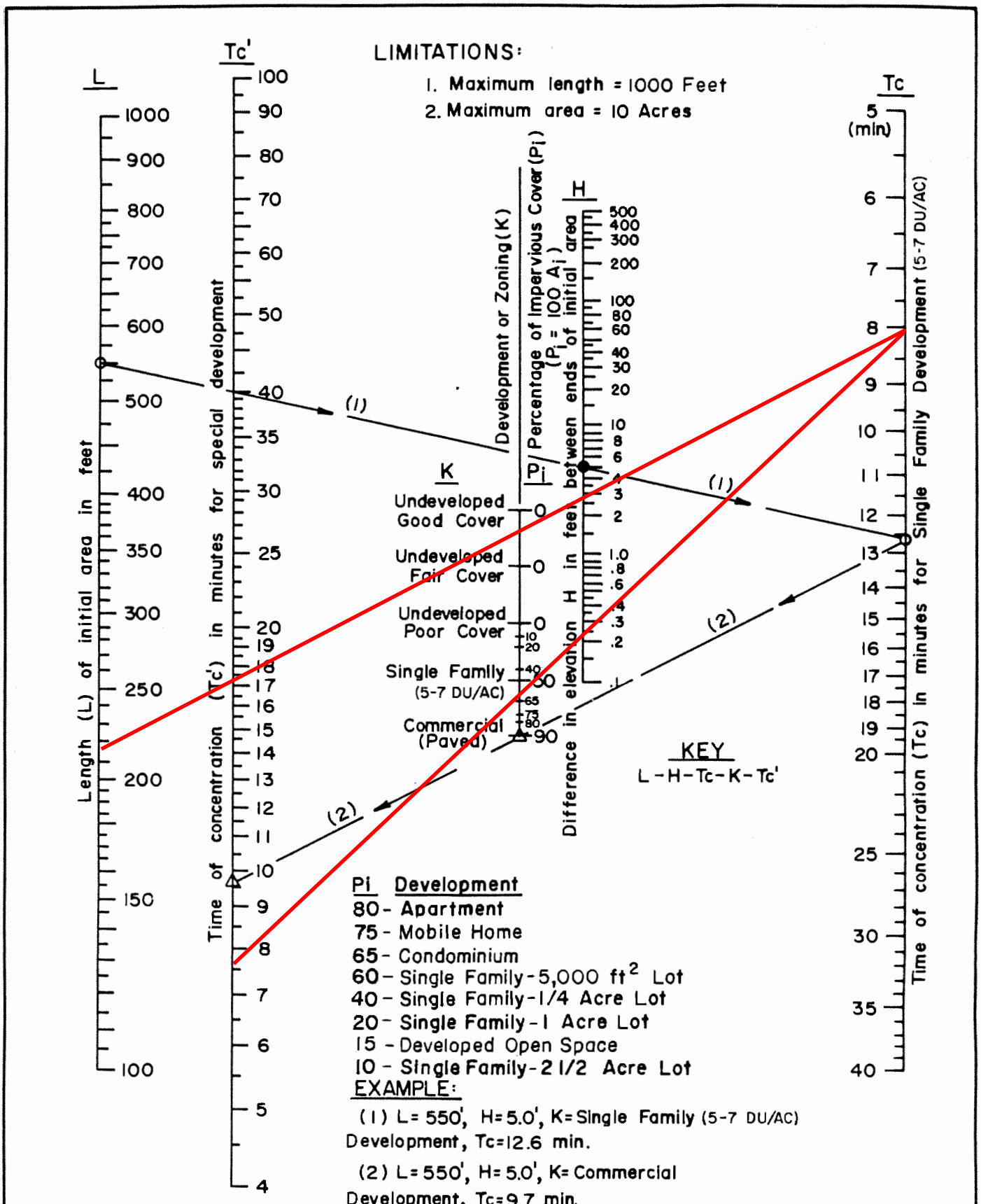
APPENDIX "A"

RATIONAL HYDROLOGY ANALYSIS

Proposed Drainage Calculation 25-yr & 100-yr

DMA A

Tc = 7.5. MIN



ORANGE COUNTY

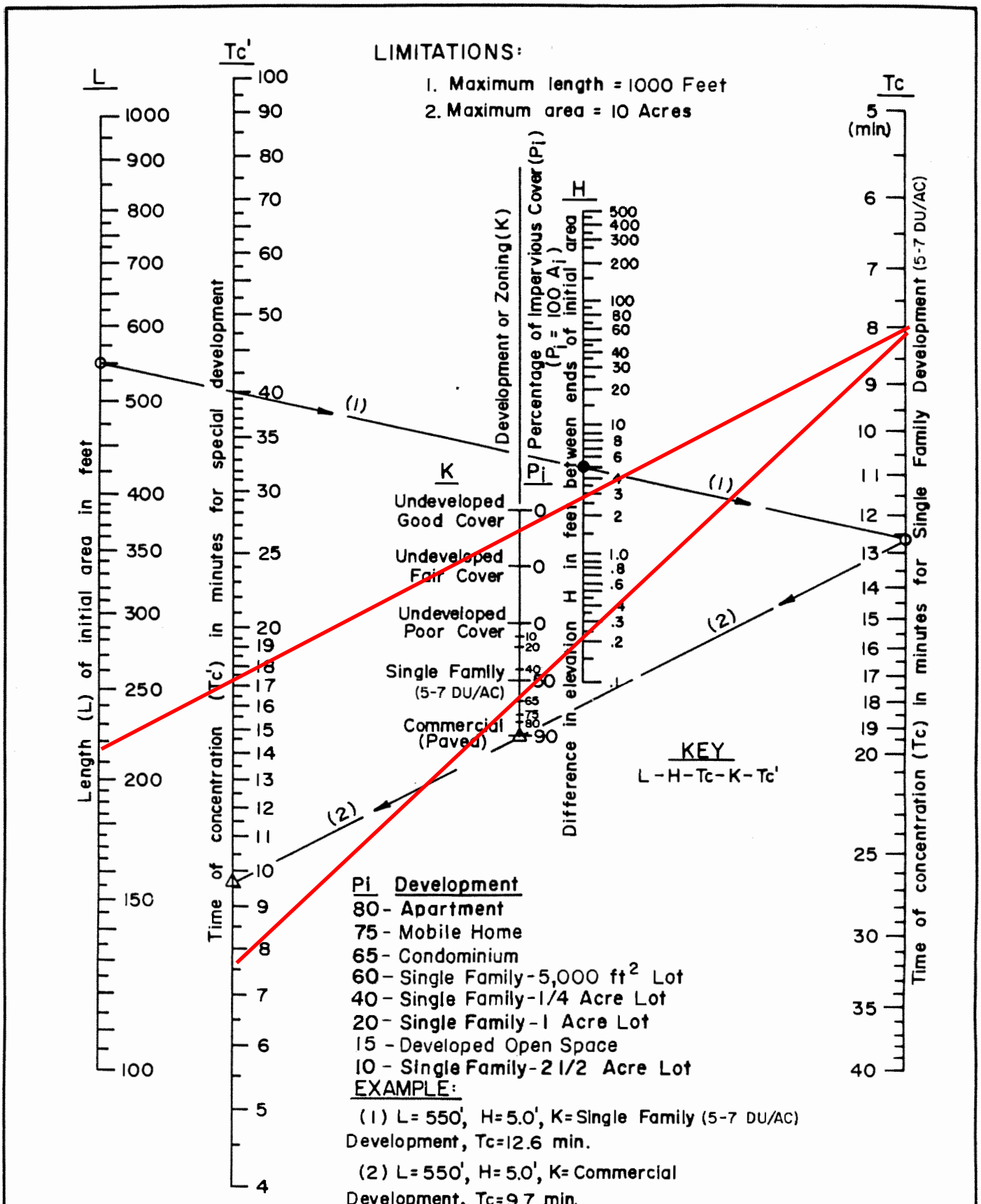
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

DMA B

Tc = 7.5 MIN



ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

```
_____
*****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1472

                          Analysis prepared by:
```

TR 17944 ANAHEIM
25 YEAR STORM RATIONAL METHOD
PROPOSED CONDITIONS

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  TIME/DATE OF STUDY: 10:14 03/17/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.00
  *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 =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
  *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
   UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  USER SPECIFIED Tc(MIN.) =    7.500
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.835
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.69      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.29
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      2.29

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    63.70  DOWNSTREAM(FEET) =    63.50
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   0.75
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.29
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    7.92
  LONGEST FLOWPATH FROM NODE      3.00 TO NODE      7.00 =      19.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.92
  RAINFALL INTENSITY(INCH/HR) =   3.72
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.69
  TOTAL STREAM AREA(ACRES) =       0.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.29

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  USER SPECIFIED Tc(MIN.) =    7.500
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.835
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.32
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.32

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

```
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    63.70  DOWNSTREAM(FEET) =    63.50
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   0.75
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.32
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    7.92
 LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =      19.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.92
 RAINFALL INTENSITY(INCH/HR) =   3.72
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.70
 TOTAL STREAM AREA(ACRES) =       0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.32

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.29    7.92    3.717  0.30( 0.15) 0.50       0.7       3.00
     2        2.32    7.92    3.718  0.30( 0.15) 0.50       0.7       5.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.61    7.92    3.718  0.30( 0.15) 0.50       1.4       5.00
     2        4.61    7.92    3.717  0.30( 0.15) 0.50       1.4       3.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.61    Tc(MIN.) =     7.92
 EFFECTIVE AREA(ACRES) =       1.39   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.4
 LONGEST FLOWPATH FROM NODE      3.00 TO NODE      7.00 =      19.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =      7.92
 EFFECTIVE AREA(ACRES) =      1.39  AREA-AVERAGED Fm(INCH/HR)=  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.500
```

PEAK FLOW RATE(CFS) = 4.61

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.61	7.92	3.718	0.30(0.15)	0.50	1.4	5.00
2	4.61	7.92	3.717	0.30(0.15)	0.50	1.4	3.00

END OF RATIONAL METHOD ANALYSIS

```
_____
*****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1472

                          Analysis prepared by:
```

TR 17944 ANAHEIM
100 YEAR STORM RATIONAL METHOD
PROPOSED CONDITIONS

```
----------------------------------------------------------------------------
  FILE NAME: 100YRPOSTA.DAT
  TIME/DATE OF STUDY: 10:06 03/17/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.00
  *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 =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
  *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
   UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  USER SPECIFIED Tc(MIN.) =    7.500
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.905
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.69      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.95
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      2.95

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    63.70  DOWNSTREAM(FEET) =    63.50
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   0.80
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.95
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    7.90
  LONGEST FLOWPATH FROM NODE      3.00 TO NODE      7.00 =      19.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.90
  RAINFALL INTENSITY(INCH/HR) =   4.76
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.69
  TOTAL STREAM AREA(ACRES) =       0.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.95

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  USER SPECIFIED Tc(MIN.) =    7.500
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.905
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.00
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      3.00

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

```
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    63.70  DOWNSTREAM(FEET) =    63.50
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   0.80
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.00
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    7.89
 LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =      19.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.89
 RAINFALL INTENSITY(INCH/HR) =   4.76
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.70
 TOTAL STREAM AREA(ACRES) =       0.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.00

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.95    7.90    4.762  0.30( 0.15) 0.50       0.7       3.00
     2        3.00    7.89    4.763  0.30( 0.15) 0.50       0.7       5.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.95    7.89    4.763  0.30( 0.15) 0.50       1.4       5.00
     2        5.95    7.90    4.762  0.30( 0.15) 0.50       1.4       3.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.95    Tc(MIN.) =     7.89
 EFFECTIVE AREA(ACRES) =       1.39   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.4
 LONGEST FLOWPATH FROM NODE      3.00 TO NODE      7.00 =      19.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =      7.89
 EFFECTIVE AREA(ACRES) =      1.39  AREA-AVERAGED Fm(INCH/HR)=  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.500
```

PEAK FLOW RATE(CFS) = 5.95

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.95	7.89	4.763	0.30(0.15)	0.50	1.4	5.00
2	5.95	7.90	4.762	0.30(0.15)	0.50	1.4	3.00

END OF RATIONAL METHOD ANALYSIS

APPENDIX "B"

RATIONAL METHOD RUNOFF VOLUME CALCULATIONS

Proposed Drainage Calculation 25-yr & 100-yr

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin,
Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao,
Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.125 (0.105-0.150)	0.165 (0.138-0.199)	0.218 (0.182-0.264)	0.262 (0.217-0.320)	0.323 (0.258-0.408)	0.370 (0.289-0.479)	0.419 (0.318-0.556)	0.469 (0.346-0.642)	0.538 (0.380-0.770)	0.593 (0.403-0.879)
10-min	0.179 (0.150-0.215)	0.236 (0.198-0.285)	0.313 (0.261-0.378)	0.376 (0.311-0.459)	0.463 (0.369-0.585)	0.530 (0.414-0.686)	0.600 (0.456-0.797)	0.672 (0.496-0.920)	0.772 (0.545-1.10)	0.849 (0.578-1.26)
15-min	0.216 (0.181-0.260)	0.286 (0.239-0.344)	0.378 (0.316-0.457)	0.454 (0.376-0.555)	0.559 (0.447-0.708)	0.641 (0.501-0.830)	0.726 (0.552-0.964)	0.813 (0.600-1.11)	0.933 (0.659-1.34)	1.03 (0.699-1.52)
30-min	0.297 (0.249-0.358)	0.393 (0.329-0.474)	0.520 (0.434-0.629)	0.625 (0.517-0.762)	0.769 (0.614-0.973)	0.882 (0.688-1.14)	0.998 (0.759-1.33)	1.12 (0.825-1.53)	1.28 (0.906-1.84)	1.41 (0.961-2.10)
60-min	0.418 (0.351-0.504)	0.553 (0.463-0.667)	0.732 (0.611-0.885)	0.879 (0.727-1.07)	1.08 (0.864-1.37)	1.24 (0.969-1.61)	1.40 (1.07-1.87)	1.57 (1.16-2.15)	1.81 (1.27-2.58)	1.99 (1.35-2.95)
2-hr	0.605 (0.507-0.728)	0.790 (0.661-0.953)	1.04 (0.865-1.25)	1.24 (1.02-1.51)	1.52 (1.21-1.92)	1.73 (1.35-2.24)	1.96 (1.49-2.60)	2.19 (1.62-2.99)	2.51 (1.77-3.58)	2.75 (1.87-4.09)
3-hr	0.746 (0.626-0.899)	0.971 (0.813-1.17)	1.27 (1.06-1.54)	1.51 (1.25-1.85)	1.85 (1.48-2.34)	2.12 (1.65-2.74)	2.38 (1.81-3.17)	2.67 (1.97-3.65)	3.05 (2.15-4.36)	3.35 (2.28-4.97)
6-hr	1.04 (0.869-1.25)	1.35 (1.13-1.62)	1.76 (1.47-2.12)	2.09 (1.73-2.55)	2.56 (2.04-3.23)	2.92 (2.28-3.78)	3.29 (2.50-4.37)	3.68 (2.71-5.03)	4.21 (2.97-6.01)	4.62 (3.15-6.85)
12-hr	1.33 (1.11-1.60)	1.73 (1.45-2.09)	2.27 (1.89-2.74)	2.71 (2.24-3.31)	3.32 (2.65-4.20)	3.80 (2.97-4.92)	4.29 (3.26-5.70)	4.80 (3.55-6.57)	5.51 (3.89-7.88)	6.06 (4.13-8.99)
24-hr	1.72 (1.52-1.98)	2.26 (2.00-2.62)	2.99 (2.64-3.47)	3.60 (3.14-4.20)	4.43 (3.75-5.34)	5.08 (4.21-6.26)	5.76 (4.66-7.26)	6.46 (5.09-8.37)	7.43 (5.62-10.0)	8.20 (6.00-11.4)
2-day	2.06 (1.82-2.37)	2.75 (2.43-3.18)	3.67 (3.24-4.26)	4.44 (3.88-5.19)	5.50 (4.65-6.63)	6.33 (5.25-7.79)	7.18 (5.81-9.06)	8.08 (6.36-10.5)	9.31 (7.05-12.6)	10.3 (7.53-14.4)
3-day	2.28 (2.01-2.63)	3.08 (2.72-3.56)	4.15 (3.66-4.81)	5.04 (4.40-5.88)	6.26 (5.30-7.56)	7.23 (5.99-8.89)	8.22 (6.65-10.4)	9.26 (7.29-12.0)	10.7 (8.09-14.4)	11.8 (8.65-16.5)
4-day	2.47 (2.19-2.85)	3.37 (2.97-3.89)	4.56 (4.02-5.28)	5.55 (4.85-6.48)	6.92 (5.86-8.35)	8.00 (6.63-9.85)	9.11 (7.38-11.5)	10.3 (8.10-13.3)	11.9 (8.99-16.0)	13.2 (9.63-18.4)
7-day	2.80 (2.48-3.23)	3.85 (3.40-4.45)	5.26 (4.63-6.10)	6.44 (5.62-7.52)	8.07 (6.83-9.73)	9.35 (7.75-11.5)	10.7 (8.65-13.5)	12.1 (9.51-15.6)	14.0 (10.6-18.9)	15.5 (11.4-21.7)
10-day	3.01 (2.67-3.48)	4.17 (3.68-4.81)	5.72 (5.03-6.62)	7.01 (6.13-8.19)	8.82 (7.46-10.6)	10.2 (8.49-12.6)	11.7 (9.49-14.8)	13.3 (10.5-17.2)	15.4 (11.7-20.8)	17.2 (12.6-23.9)
20-day	3.55 (3.14-4.10)	4.93 (4.36-5.70)	6.81 (6.00-7.89)	8.39 (7.33-9.80)	10.6 (8.97-12.8)	12.4 (10.3-15.2)	14.2 (11.5-17.9)	16.2 (12.7-20.9)	18.9 (14.3-25.5)	21.1 (15.4-29.4)
30-day	4.16 (3.68-4.80)	5.77 (5.09-6.66)	7.96 (7.01-9.22)	9.81 (8.57-11.5)	12.4 (10.5-15.0)	14.5 (12.0-17.9)	16.7 (13.5-21.0)	19.0 (15.0-24.6)	22.3 (16.8-30.0)	24.9 (18.2-34.7)
45-day	4.94 (4.37-5.71)	6.78 (5.99-7.84)	9.30 (8.19-10.8)	11.4 (10.00-13.4)	14.5 (12.3-17.5)	16.9 (14.0-20.8)	19.5 (15.8-24.6)	22.2 (17.5-28.8)	26.1 (19.7-35.2)	29.2 (21.3-40.7)
60-day	5.76 (5.09-6.65)	7.81 (6.89-9.02)	10.6 (9.35-12.3)	13.0 (11.4-15.2)	16.4 (13.9-19.8)	19.2 (15.9-23.6)	22.1 (17.9-27.8)	25.2 (19.8-32.6)	29.5 (22.3-39.8)	33.1 (24.2-46.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

HYDROLOGY CALCULATIONS

Mayers and Associates
19 Spectrum Point Drive
Lake Forest, CA 92630
By: CR

Runoff Volume Calculations

$$V = \frac{C*A*P_{24}}{12}$$

Where :

V = Volume in acre-ft.

C= Coefficient of Runoff

= 0.9 [Ai + ((I-Fp)/I)*Ap]

P_{24} = 24-hour storm rainfall

F_p = AMC-II = 0.3

Pre-Dev Factors: Ai = 0.13 Ap= 0.87

A = Drainage area in acres

25 YEAR STORM EVENT

Return Frequency = **25 Year**

PRE-DEVELOPMENT								
Drainage Area	**A (acres)**	**Soils Group**	**Ai**	**Ap**	**C**	**I (in/hr)**	**P_{24} (in)**	**V (Ac-ft)**
DMA-X	1.39	B	0.13	0.87	0.68	1.08	4.43	0.35
	1.39							**0.35**

Return Frequency = **25 Year**

POST-DEVELOPMENT								
Drainage Area	**A (acres)**	**Soils Group**	**Ai**	**Ap**	**C**	**I (in/hr)**	**P_{24} (in)**	**V (Ac-ft)**
DMA-A	0.70	B	0.67	0.33	0.82	1.08	4.43	0.21
DMA-B	0.69	B	0.67	0.33	0.82	1.08	4.43	0.21
	1.39							**0.42**

Volume (DV) = Post Development Volume - Pre Development Volume

DV = 0.069 Ac-feet 3,018

HYDROLOGY CALCULATIONS

Mayers and Associates
19 Spectrum Point Drive
Lake Forest, CA 92630
By: CR

100 YEAR STORM EVENT

Return Frequency = **100 Year**

PRE-DEVELOPMENT

Drainage Area	A (acres)	Soils Group	Ai	Ap	C	I (in/hr)	P_{24} (in)	V (Ac-ft)
DMA-X	1.39	B	0.13	0.87	0.73	1.40	5.76	0.49
	1.39							**0.49**

Return Frequency = **100 Year**

POST-DEVELOPMENT

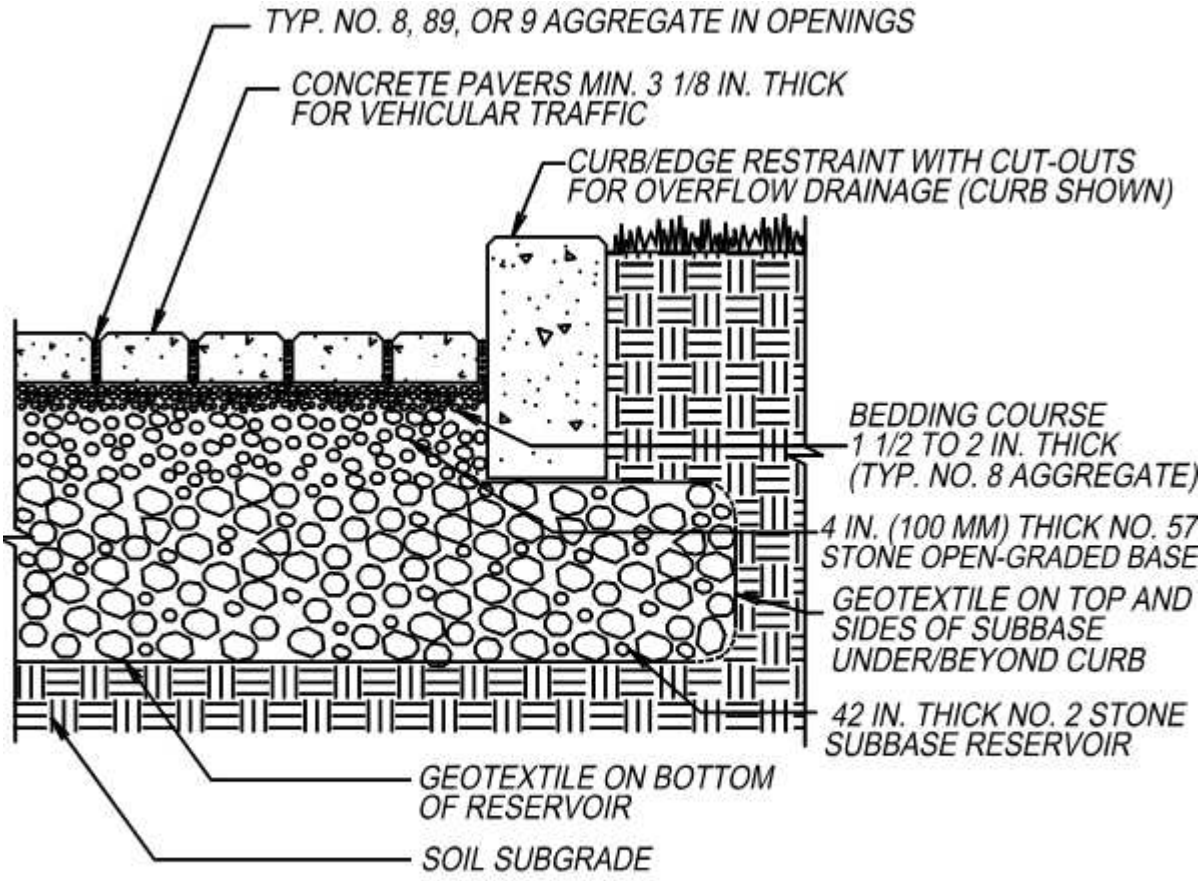
Drainage Area	A (acres)	Soils Group	Ai	Ap	C	I (in/hr)	P_{24} (in)	V (Ac-ft)
DMA-A	0.70	B	0.67	0.33	0.84	1.40	5.76	0.28
DMA-B	0.69	B	0.67	0.33	0.84	1.40	5.76	0.28
	1.39							**0.56**

Volume (DV) = Post Development Volume - Pre Development Volume

DV = 0.069 Ac-feet 3,027

100-Year Increase Runoff Mitigation Explanation

The difference between the 100 year pre and post development rain event is 3,078 cf of volume. (See calculations above) To mimic the pre-existing conditions, permeable pavers with a subbase reservoir is being proposed to retain and hold the excess amount of volume created by the development. The permeable pavement will have a total depth of 48” with a subbase reservoir depth of 42” out of the total 48”. (See detail below)
The intention of the permeable pavement is to hold the net flow from the 100 year storm and infiltrate that water unto the ground. In cases where heavy storms occur, water will fill up the permeable pavement to the capacity of the net 100 year storm and over flow out onto Western Avenue, mimicking existing site conditions.



NOTES:

1. NO. 2 STONE MAY BE SUBSTITUTED WITH NO.3 OR NO.4 STONE.

APPENDIX "C"

EXISTING 30" RCP ANALYIS

S. Western Avenue Flooding Explanation Document

S. Western Avenue existing Street Flow Calculation

S. Western Avenue SD model sheet

Existing 30” RCP analysis on Western Avenue

Pepperwood LLP sits with in drainage basin 3 on the city of Anaheim master drainage map. Per section 6.2 of analysis of existing improvements it has been determined that Western Avenue storm drain is a 30-inch RCP with a capacity of 25 cfs which is equivalent to 45 percent of a 10-year storm. Also in the same study it has been determined that the 1,145 feet of RCP on Western Avenue requires replacement with 30” to 48” RCP.

From this information, it shows that the current 30” RCP is inadequate to handle the proposed 10-year storms draining to it. From the proposed hydrology map analyzing the existing 30” RCP done by Mayers and associates it has been calculated that at minimum the 10 year storm draining to the RCP pipe is 40.5 cfs which already exceed the maximum amount of water the 30” RCP can handle.

Mayers and Associates is proposing to change the drainage from surface flow to infiltration into permeable pavement. The permeable pavement will not have any tie in with the existing 30” RCP on Western Avenue in order to minimize any adverse impact from the new development onto the inadequate 30” RCP.

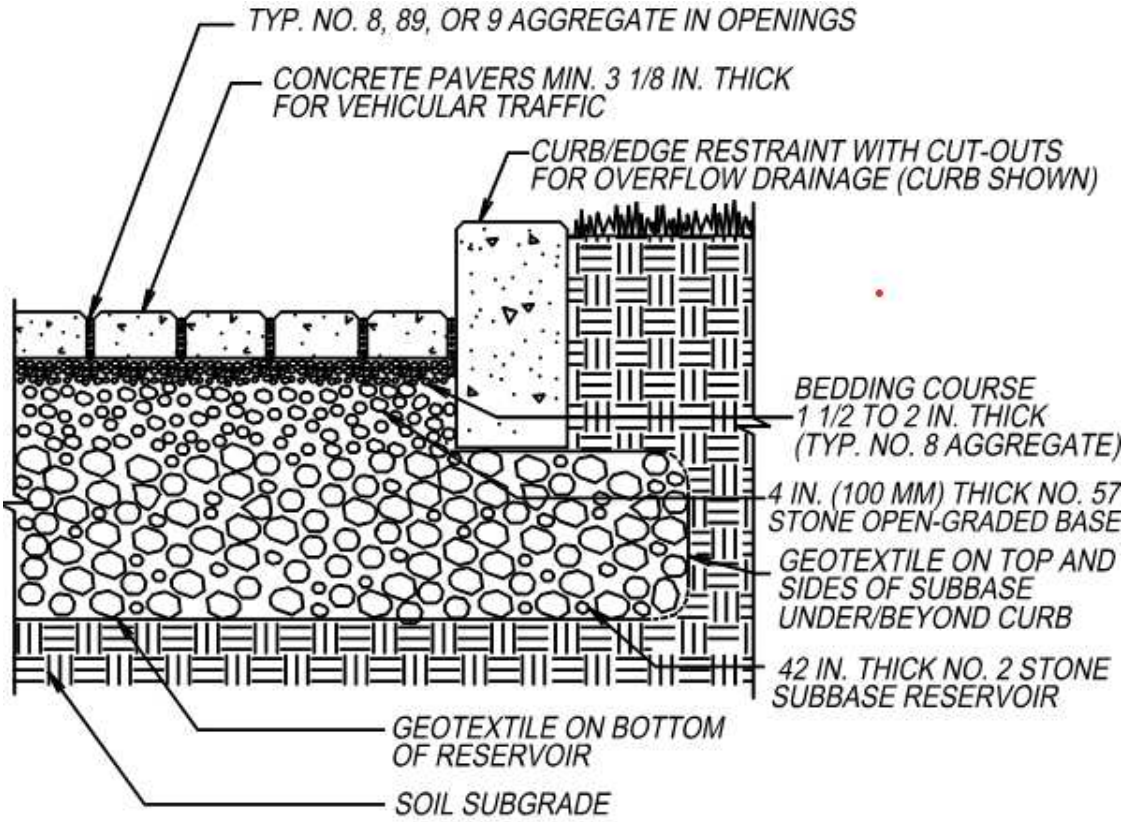
Since the existing 30” RCP is already inadequate, analysis of the surface flow on Western Avenue must be done to show net affect. Currently Western Avenue reaches a depth of 0.686’ height when a 10 year storm is produced, exceeding the top of curbs but not exceeding the right of way. Since there is not direct connection to the 30” RCP and the 100 year net flow will be contained within the reservoir storage portion of the permeable pavement, it can be concluded that no net adverse effect will be produced on the existing storm drain line on Western Avenue.

The Pepperwood project would have a net effect on Western Avenue’s street depth with an increase of 0.01”. The increase of 0.01” depth of street flow depth is due to the slight increase of impervious area from the proposed residential development. In result the net effect of this development is almost exactly the same as existing conditions since ultimately the site will drain to Western when a heavy storm occurs.

Lastly to mitigate the increase runoff from the development we are proposing permeable pavement to mimic pre-existing conditions and hold the net Q from the 100 year storm. Runoff from the development will infiltrate the permeable pavement and not be allowed to drain to the existing 30" RCP storm drain on Western Avenue. During heavy storm event where the water doesn't infiltrate in a timely matter water will overflow onto Western Avenue mimicking existing conditions.

Permeable pavers exhibit extremely high infiltration rate (785 to 2544 in/hr) which are orders of magnitude higher than any design storm including the 100 year storm. Since the slope of the permeable pavers is relatively flat (less then 1% slope) the area provided will intercept the 100 year flow rate and not by pass the pervious area, until reservoir portion is to capacity.

Permeable Pavement Section Detail



NOTES:

1. NO. 2 STONE MAY BE SUBSTITUTED WITH NO.3 OR NO.4 STONE.

Permeable Pavement Drawdown Explanation

Per the infiltration report in Section 6, the site's infiltration rate is 0.98"/hr with a factor of safety of 2.

Total depth of the permeable pavement is 48".
Drawdown time = total depth / infiltration rate
Drawdown time = 48" / 0.98" an hour
Drawdown time = 49 hours
49 hours of drawdown time is sufficient to meet wqmp standards hence ok.

STORAGE CAPACITY CALCULATIONS:

DV = POST DEVELOPMENT VOLUME - PRE DEVELOPMENT VOLUME

YEAR FREQUENCY = 100 YEARS
DV (100 YEARS) = 3,027 CF OF VOLUME

PERMEABLE PAVERS = 2,455 SF AREA
RESERVOIR PERMEABLE PAVERS DEPTH = 3.5'
RESERVOIR PERMEABLE PAVERS POROSITY = 0.35

NET VOLUME RETENTION IN RESERVOIR PERMEABLE PAVERS =
2,455 SF X 3.5' DEPTH X 0.35 POROSITY = 3,007 CF DV

BEDDING COURSE AND STONE OPEN GRADED BASE DEPTH = 0.5'
BEDDING COURSE AND STONE BASE POROSITY = 0.3
BEDDING COURSE AND STONE BASE AREA = 2,455 SF

NET VOLUME IN BEDDING COURSE AND STONE BASE =
2,455 SF X 0.5' DEPTH X 0.3 = 368 CF DV

TOTAL VOLUME PROVIDED = RESERVOIR AREA +BEDDING
COURSE AREA + STONE BASE AREA

TOTAL VOLUME PROVIDED = 3,007 CF + 368 CF = 3375 CF
DV

3,375 CF DV PROPOSED > 3,027 CF DV REQUIRED, HENCE
ADEQUATELY SIZED.
SINCE 100 YEAR STORM IS SIZED ADEQUATELY, ALL YEAR
STORMS BELOW THE 100 YEAR WILL ALSO BE STORED IN THE
DV PROPOSED.

Street Flow Calculation **Designer: Cesar Ramirez**
Western Avenue **Date: 03/25/21 08:48 AM**

***** Input Data *****

Pkwy. Slope = 0.0200	Street Slope = 0.0170
Half R/W Width = 45.00'	Half Street Width = 32.00'
Curb Height = 0.50'	Curb Batter = 0.1250'
Gutter Width = 2.00'	Gutter Hike = 0.1250'
Gutter Lip = 0.0300'	
N(Road) = 0.015	N(Pkwy) = 0.050

***** Output Data *****

Slope of Curb Face = 4.0000	Slope of Gutter = 0.0667'
Depth at Crown = 0.6650'	Depth at R/W = 0.7600'

Depth	Flood Width	Area	Perim	Q/So^1/2
0.10'	1.52'	0.08	1.61'	1.0
0.11'	1.68'	0.09	1.77'	1.3
0.12'	1.83'	0.11	1.93'	1.6
0.13'	1.91'	0.14	2.02'	2.3
0.14'	1.91'	0.16	2.04'	2.8
0.15'	1.91'	0.18	2.06'	3.4
0.16'	2.21'	0.20	2.37'	3.8
0.17'	2.80'	0.23	2.97'	4.0
0.18'	3.39'	0.26	3.57'	4.4
0.19'	3.98'	0.30	4.16'	5.0
0.20'	4.57'	0.34	4.76'	5.8
0.21'	5.16'	0.39	5.36'	6.7
0.22'	5.75'	0.45	5.96'	7.8
0.23'	6.34'	0.51	6.56'	9.1
0.24'	6.94'	0.57	7.16'	10.6
0.25'	7.53'	0.65	7.76'	12.3
0.26'	8.12'	0.73	8.35'	14.2
0.27'	8.71'	0.81	8.95'	16.3
0.28'	9.30'	0.90	9.55'	18.6
0.29'	9.89'	1.00	10.15'	21.2
0.30'	10.48'	1.10	10.75'	24.0
0.31'	11.07'	1.21	11.35'	27.1
0.32'	11.66'	1.33	11.95'	30.4
0.33'	12.25'	1.45	12.54'	34.1
0.34'	12.84'	1.58	13.14'	38.0
0.35'	13.43'	1.71	13.74'	42.2
0.36'	14.02'	1.85	14.34'	46.7
0.37'	14.61'	1.99	14.94'	51.5
0.38'	15.21'	2.14	15.54'	56.6
0.39'	15.80'	2.30	16.14'	62.1
0.40'	16.39'	2.46	16.74'	67.9
0.41'	16.98'	2.63	17.33'	74.0
0.42'	17.57'	2.80	17.93'	80.6
0.43'	18.16'	2.98	18.53'	87.4
0.44'	18.75'	3.17	19.13'	94.7
0.45'	19.34'	3.36	19.73'	102.3
0.46'	19.93'	3.56	20.33'	110.3
0.47'	20.52'	3.76	20.93'	118.7
0.48'	21.11'	3.97	21.52'	127.5
0.49'	21.70'	4.19	22.12'	136.7
0.50'	22.29'	4.41	22.72'	146.3

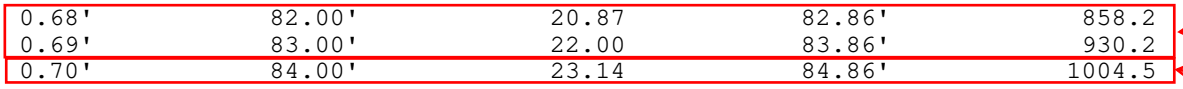
Depth Exceeds Curb

0.51'	23.38'	4.64	23.81'	156.4
0.52'	24.47'	4.88	24.90'	167.0
0.53'	25.56'	5.13	25.99'	178.0
0.54'	26.65'	5.39	27.08'	189.5
0.55'	27.74'	5.67	28.16'	201.5
0.56'	28.82'	5.95	29.25'	214.0
0.57'	29.91'	6.25	30.34'	227.0
0.58'	31.00'	6.55	31.43'	240.5
0.59'	32.09'	6.87	32.52'	254.5
0.60'	33.18'	7.20	33.61'	269.0
0.61'	34.26'	7.54	34.69'	284.1
0.62'	35.35'	7.89	35.78'	299.8
0.63'	36.44'	8.25	36.87'	316.0
0.64'	37.53'	8.62	37.96'	332.8

0.65'	38.62'	9.00	39.05'	350.2
0.66'	39.71'	9.40	40.14'	368.2

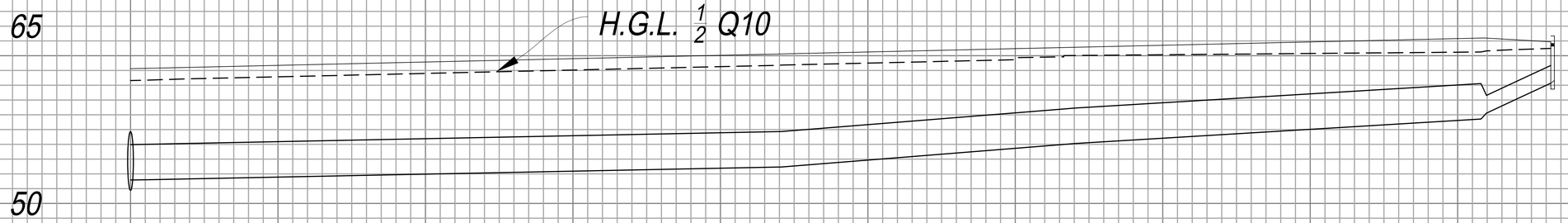
Depth Exceeds Crown

0.67'	81.00'	19.75	81.86'	788.6
0.68'	82.00'	20.87	82.86'	858.2
0.69'	83.00'	22.00	83.86'	930.2
0.70'	84.00'	23.14	84.86'	1004.5
0.71'	85.00'	24.29	85.86'	1081.2
0.72'	86.00'	25.45	86.86'	1160.1
0.73'	87.00'	26.61	87.86'	1241.4
0.74'	88.00'	27.79	88.86'	1324.9
0.75'	89.00'	28.98	89.86'	1410.7
0.76'	90.00'	30.18	90.86'	1498.7



Net increase of 0.01' depth.

Depth Exceeds Right of Way



$Q_{½\ 10}$ = 19.7 c.f.s.
V_{MAX} = 4.0 f.p.s.

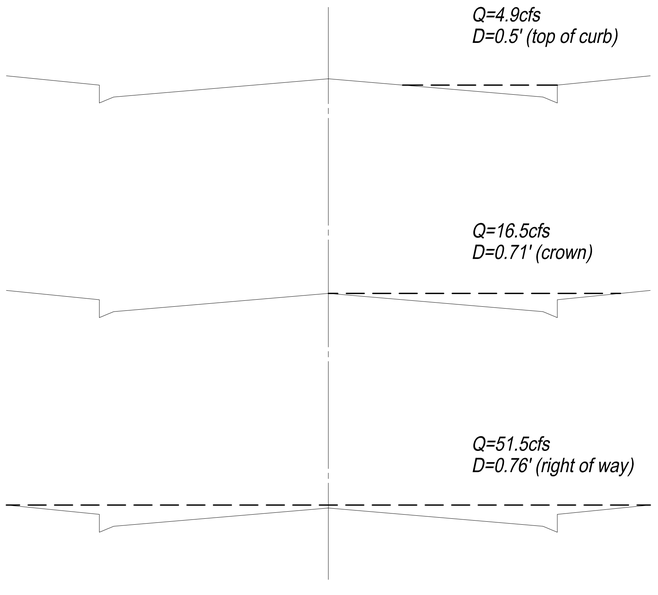
$Q_{½\ 10}$ = 15.8 c.f.s.
V_{MAX} = 3.2 f.p.s.

$Q_{½\ 10}$ = 12.1 c.f.s.
V_{MAX} = 2.5 f.p.s.

$Q_{½\ 10}$ = 6.1 c.f.s.
V_{MAX} = 3.4 f.p.s.

0 1 2 3 4 5 6 7 8 9 10 11 12

PROFILE SCALES	
HORIZ.:	1"= 50
VERT.:	1"= 5



IV. EXHIBITS

EXHIBIT A	NRCS SOILS MAP
EXHIBIT B	RATIONAL HYDROLOGY MAP (EXISTING CONDITIONS)
EXHIBIT C	RATIONAL HYDROLOGY MAP (PROPOSED CONDITIONS)

EXHIBIT A

NRCS SOILS MAP

Report — Map Unit Description

Orange County and Part of Riverside County, California

163—Metz loamy sand

Map Unit Setting

National map unit symbol: hcn8
Elevation: 30 to 2,500 feet
Mean annual precipitation: 20 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 200 to 340 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Metz and similar soils: 80 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Metz

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from mixed

Typical profile

H1 - 0 to 17 inches: loamy sand
H2 - 17 to 63 inches: stratified sand to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: SANDY (1975) (R019XD035CA)
Hydric soil rating: No

Minor Components

Riverwash

Percent of map unit: 4 percent
Landform: Fans
Hydric soil rating: Yes

San emigdio, fine sandy loam

Percent of map unit: 4 percent
Hydric soil rating: No

Hueneme, fine sandy loam

Percent of map unit: 4 percent
Hydric soil rating: No

Corralitos, loamy sand

Percent of map unit: 4 percent
Hydric soil rating: No

Metz, mod fine substratum

Percent of map unit: 4 percent
Hydric soil rating: No

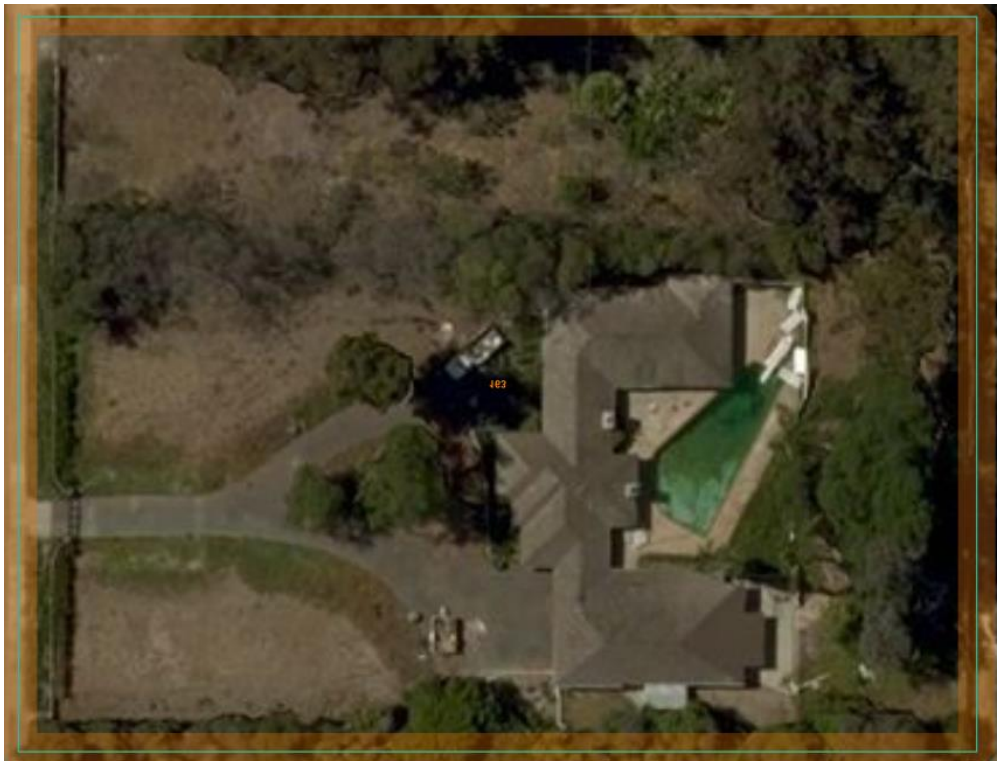
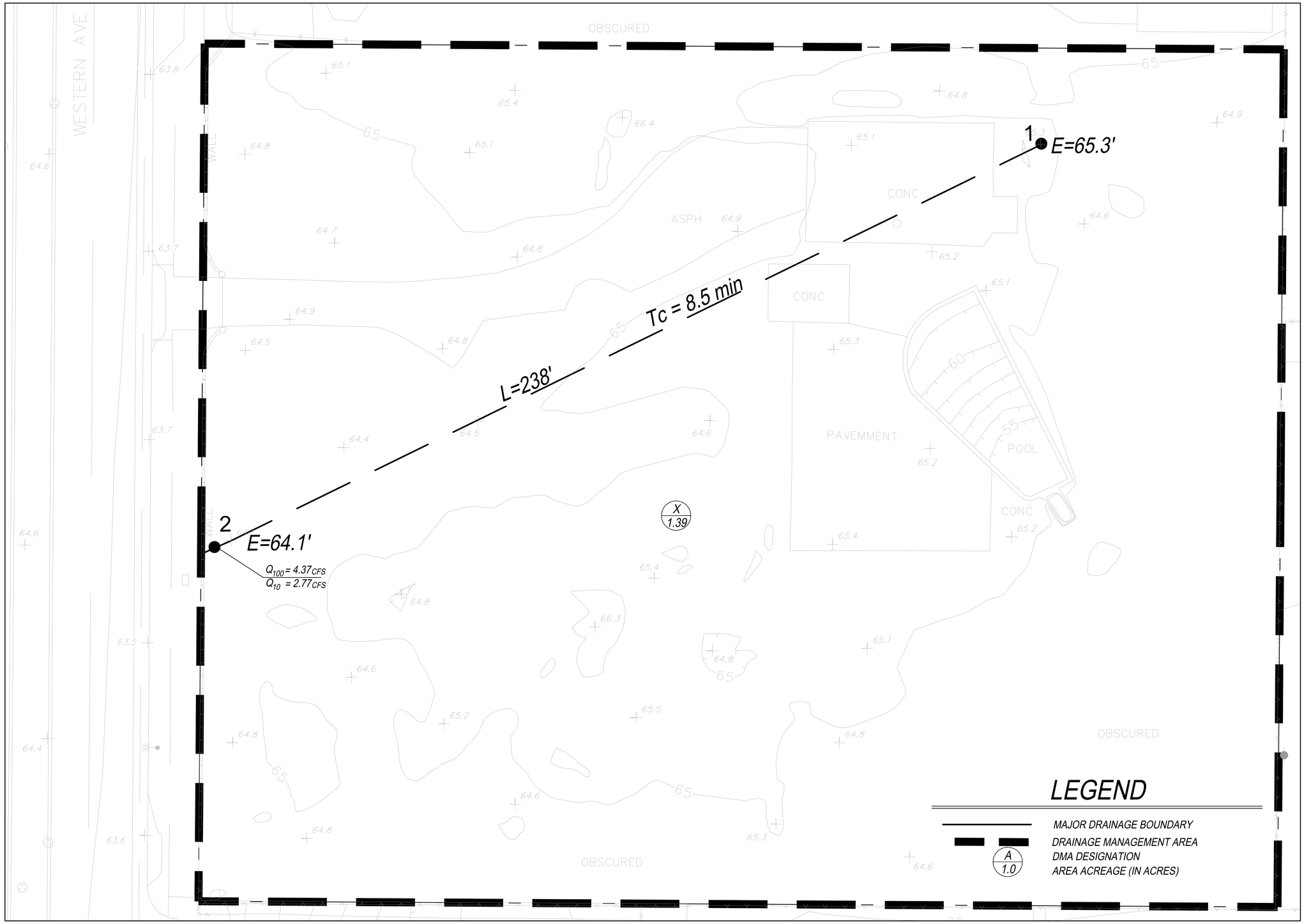


EXHIBIT B

RATIONAL HYDROLOGY MAP (EXISTING CONDITIONS)

EXISTING HYDROLOGY
CITY OF ANAHEIM TRACT 17944



LEGEND

- MAJOR DRAINAGE BOUNDARY
- DRAINAGE MANAGEMENT AREA
- A / 1.0 — DMA DESIGNATION / AREA ACREAGE (IN ACRES)

FEMA MAP: 06059C0109J
ZONE: X

N
SCALE: 1" = 10'

GRAPHIC SCALE
10 0 5 10 20
(IN FEET)
SCALE: 1" = 10'

REGISTERED PROFESSIONAL ENGINEER
GREG J. MAYERS
No. 38474
CIVIL
STATE OF CALIFORNIA

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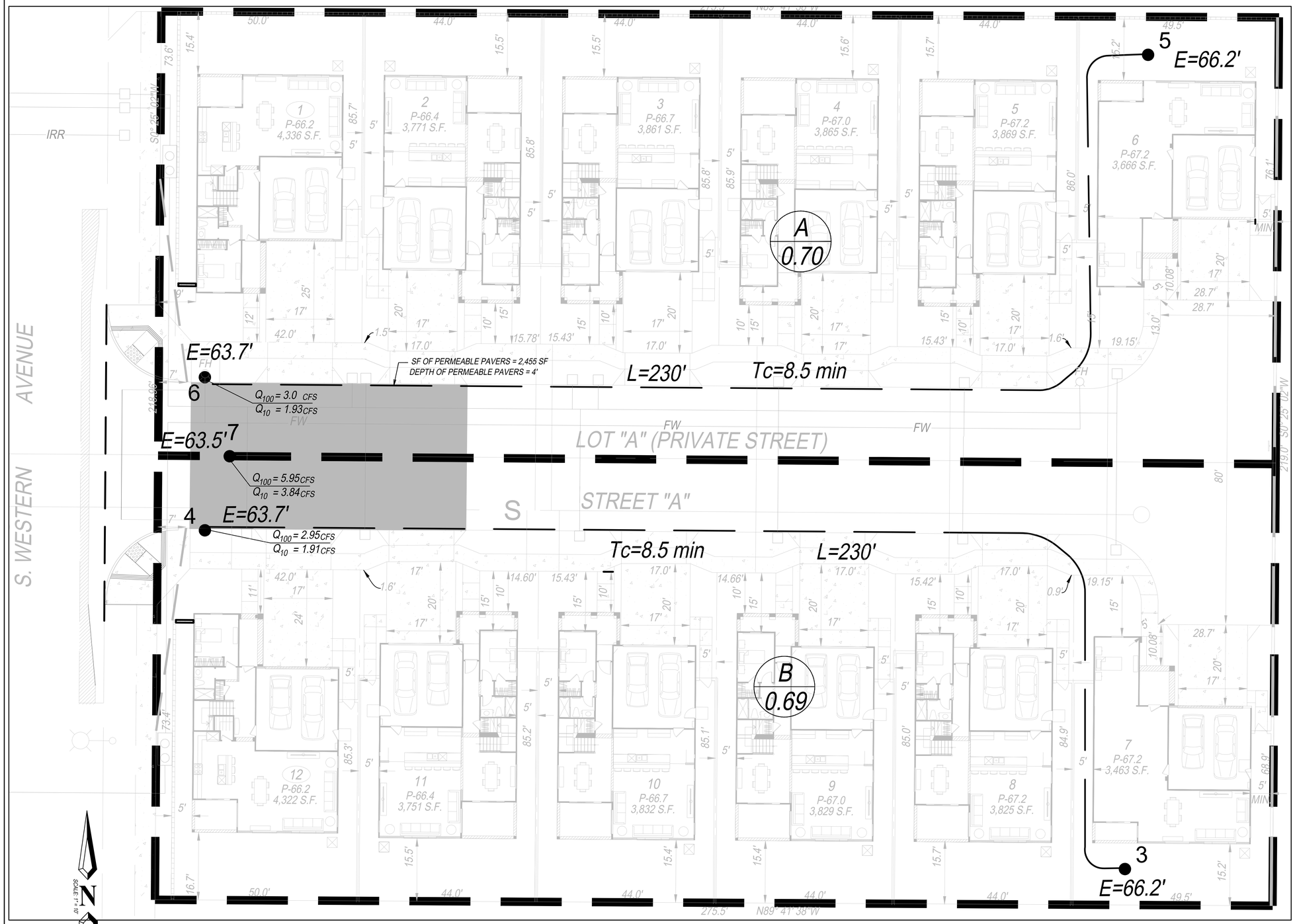
EXISTING HOC MAP
TRACT 17944

EXHIBIT C

RATIONAL HYDROLOGY MAP (PROPOSED CONDITIONS)

PROPOSED HYDROLOGY
CITY OF ANAHEIM TRACT 17944



LEGEND

MAJOR DRAINAGE BOUNDARY
DRAINAGE MANAGEMENT AREA
A — DMA DESIGNATION
1.0 — AREA ACREAGE (IN ACRES)

TREATMENT CONTROL BMPs

PERMEABLE PAVEMENT

STORAGE CAPACITY CALCULATIONS:

DV = POST DEVELOPMENT VOLUME - PRE DEVELOPMENT VOLUME

YEAR FREQUENCY = 100 YEARS
DV (100 YEARS) = 3,027 CF OF VOLUME

PERMEABLE PAVERS = 2,455 SF AREA
RESERVOIR PERMEABLE PAVERS DEPTH = 3.5'
RESERVOIR PERMEABLE PAVERS POROSITY = 0.35

NET VOLUME RETENTION IN RESERVOIR PERMEABLE PAVERS = 2,455 SF X 3.5' DEPTH X 0.35 POROSITY = 3,007 CF DV

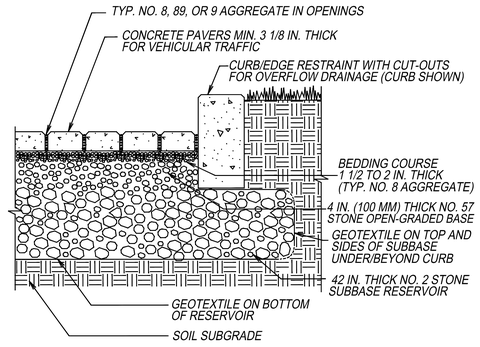
BEDDING COURSE AND STONE OPEN GRADED BASE DEPTH = 0.5'
BEDDING COURSE AND STONE BASE POROSITY = 0.3
BEDDING COURSE AND STONE BASE AREA = 2,455 SF

NET VOLUME IN BEDDING COURSE AND STONE BASE = 2,455 SF X 0.5' DEPTH X 0.3 = 368 CF DV

TOTAL VOLUME PROVIDED = RESERVOIR AREA +BEDDING COURSE AREA + STONE BASE AREA

TOTAL VOLUME PROVIDED = 3,007 CF + 368 CF = 3375 CF DV

3,375 CF DV PROPOSED > 3,027 CF DV REQUIRED, HENCE ADEQUATELY SIZED.
SINCE 100 YEAR STORM IS SIZED ADEQUATELY, ALL YEAR STORMS BELOW THE 100 YEAR WILL ALSO BE STORED IN THE DV PROPOSED.



NOTES:
1. NO. 2 STONE MAY BE SUBSTITUTED WITH NO.3 OR NO.4 STONE.

PERMEABLE PAVERS EXHIBIT EXTREMELY HIGH INFILTATION RATE (785 TO 2544 IN/HR) WHICH ARE ORDERS OF MAGNITUDE HIGHER THAN ANY DESIGN STORM INCLUDING THE 100 YEAR STORM. SINCE THE SLOPE OF THE PERMEABLE PAVERS IS RELATIVELY FLAT (LESS THEN 1% SLOPE) THE AREA PROVIDED WILL INTERCEPT THE 100 YEAR FLOW RATE AND NOT BY PASS THE PERVIOUS AREA, UNTIL RESERVOIR PORTION IS TO CAPACITY.

FEMA MAP: 06059C0109J
ZONE: X

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PROPOSED HOC MAP
TRACT 17944