PRELIMINARY HYDROLOGY STUDY

FOR

SAN MARCOS RESIDENCES
2972 &2982 S SANTA FE AVENUE
APN: 217-161-18

CITY OF SAN MARCOS, CA

PREPARED FOR:

SANTA FE FLORES LP
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1.0 EXECUTIVE SUMMARY

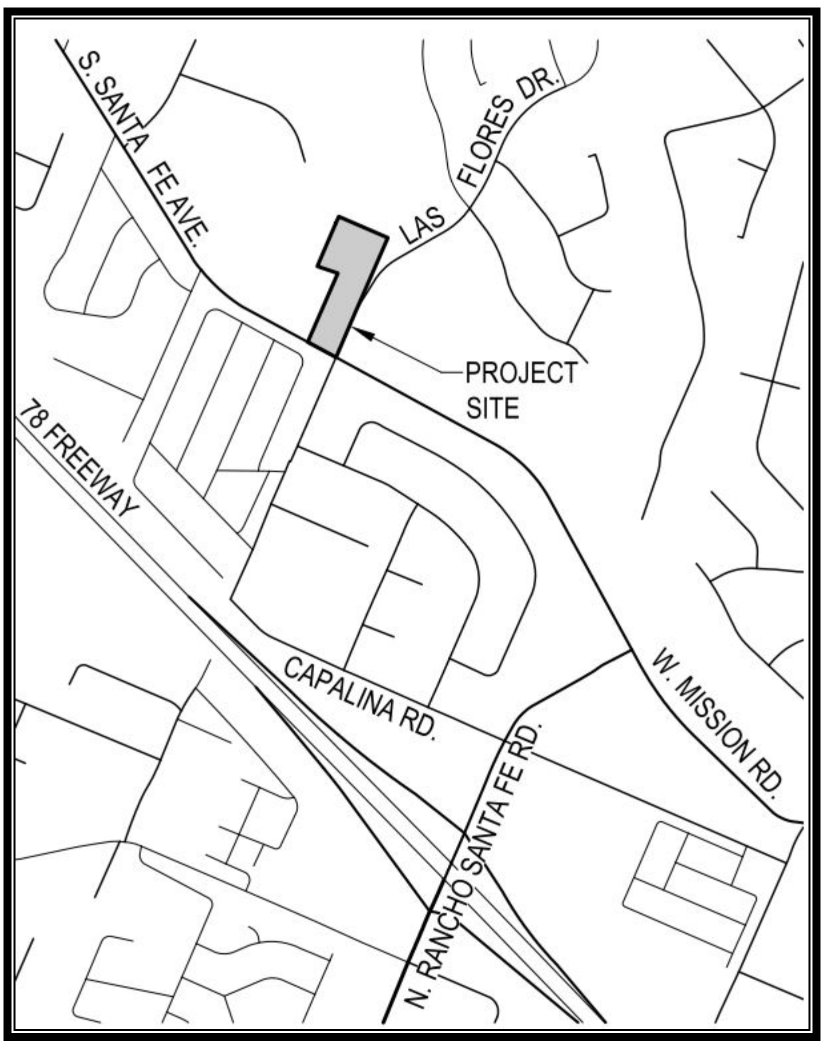
1.1 Introduction

This Hydrology Study for the proposed development has been prepared to analyze the hydrologic characteristics of the existing and proposed project site. This report presents both the methodology and the calculations used for determining the storm water runoff from the project site in the pre-developed (existing) conditions and the post-developed (proposed) conditions produced by the 100-year, 6-hour storm event.

1.2 Existing Conditions

The subject property is located at 2972 & 2982 S. Santa Fe Avenue in the City of Vista. The site is west of Las Flores Drive, north of South Santa Fe Avenue, and approximately 1/4 mile north of the 78 freeway.

Vicinity Map



The site is surrounded by residential homes to the north, east and south, and industrial offices to the west. The site is primarily undeveloped with a shared access driveway at the property's southerly boundary. The driveway also provides access to the adjacent commercial property's parking lot and commercial building. The southern portion of the site is relatively flat while the central portion slopes up to an elevated pad at the north end of the site. Las Flores Drive along the property's eastern boundary has approximately a 15-20% grade upward to the north to allow vehicle access over the railroad tracks north of the property. Elevations across the site range from a high of approximately 546 feet in the northeast corner of the property to a low of approximately 494.50 feet at the southwest corner of the property.

The project site is approximately 2.23 acres. In the existing condition, the project site is divided into four drainage basins (see Pre-Project Hydrology Map in Appendix C).

Drainage basin E1 consists of the northerly half graded pad where runoff flows overland and into an existing storm drain inlet structure in the center of the pad. Captured runoff exits the site through an existing 18" RCP at the easterly boundary and into the public storm drain system within Las Flores Drive. Drainage Basin E2 is a similar, but much smaller, sump condition into a storm drain inlet structure exists just southerly of the north half sump condition mentioned above. Captured runoff also exits the site through a separate 18" RCP at the easterly boundary and into the public storm drain system within Las Flores Drive where it confluences with the north half pad runoff. Pipe flows continue to travel southerly down Las Flores Drive before combining with flows from a 54" RCP and 24" RCP. Combined pipe flows are then diverted to the west along South Santa Fe Avenue through a 60" RCP.

Drainage Basin E3 consists of the southern half of the site where runoff generated from the adjacent liquor store property and the project site combines to surface flow southerly. Surface runoff exits the drainage basin through the existing shared access driveway on South Santa Fe Avenue then into the public street's curb and gutter and flows northerly approximately 100' before being captured by an existing curb inlet structure. Captured runoff is diverted across South Santa Fe Avenue through an 18" RCP storm drain pipe and into a 60" RCP that continues flowing westerly.

Drainage Basin E4 is located along the west edge of Drainage Basin E1 north half pad, a small area of existing graded slopes that surface flows to the west and onto the adjacent property.

Per the United States Department of Agriculture Web Soil Survey, the project site is underlain with Hydrologic Soil Group C and D. Refer to Appendix A for soil information.

Area weighted runoff coefficients were calculated using the methodology described in section 3.2.1 of the San Diego County Hydrology Manual and Table 3-1 Runoff Coefficients for Urban Areas. Using the Rational Method Procedure outlined in the San Diego County Hydrology Manual, a peak flow rate was calculated for the existing condition 100-year, 6-hour storm event. The following table summarizes the existing condition hydrologic data.

Summary of Existing Condition 100-yr Peak Discharge Rates

Drainage Basin ID	Area (ac)	Q100 (cfs)
E1	1.24	2.35
E2	0.04	0.10
E3	1.65	5.16
E4	0.12	0.31

Refer to the existing condition hydrologic calculations included in Section 3.1 for detailed analysis.

1.3 Proposed Project

The project proposes to develop the existing site into a 54-unit multifamily residential development consisting of 1-bed/1-bath units and 2-bed/2-bath units, access drive, parking stalls, landscape, associated utilities and improvements, proprietary biofiltration systems to meet the requirements for pollutant control and underground storm water storage facilities to meet the requirements for hydromodification management flow control and to mitigate for the 100-year 6-hour storm event.

In the proposed condition, onsite storm water runoff will be collected in a proposed storm drain system and conveyed to the proposed proprietary biofiltration system (BMPs) and subsequently the proposed underground storage facilities (BMPs). Two storm drain systems, each with their own BMPs, are proposed to maintain the site's historical points of discharge.

In the proposed condition, the project site consists of five drainage basins (see Post-Project Hydrology Map in Appendix C).

Drainage Basin P1 consists of the proposed site's upper level building, north parking lot area and a portion of existing public ROW hillside area that drains into the project site at the northeast corner of the property. Surface runoff will sheet flow southwesterly across the parking area, through a curb opening and into a proprietary biofiltration system. Treated flows and peak flows will enter the private storm drain pipe system then divert pipe flows to an underground storm water storage facility before exiting the project site through an existing 18" RCP storm drain pipe that flows out into the public storm drain system in Las Flores Drive.

Drainage Basin P2 consists of the proposed sites' lower level building, south parking lot area, and access road. Surface runoff will sheet flow southerly down the access road, across the parking area then through curb openings into one of two proprietary biofiltration systems. Treated flows and peak flows will enter the private storm drain pipe system then divert pipe flows to an underground storm water storage facility before exiting the project site through a new 18" RCP storm drain pipe and connect to the existing 60" RCP storm drain pipe in South Santa Fe Avenue.

Drainage Basin P3 consists of the adjacent property's existing commercial building, existing parking area and existing undeveloped hillside to the west of the project site. A new concrete ditch is proposed along the project site's westerly boundary along the new access road and a new ribbon gutter along the existing parking area to capture off-site runoff without comingling with on-site runoff and divert the surface flows out onto South Santa Fe Avenue as in the existing condition.

Drainage Basin P4 consists of the existing hillside area at the northwest corner of the site. Storm water runoff will surface flow westerly and onto the adjacent property as in the existing condition.

Drainage Basin P5 consists of the existing public right-of-way hillside area at the northeast corner of the project site. A new concrete ditch is proposed along the project's easterly boundary to capture off-site runoff from the hillside without comingling with on-site runoff and divert the surface flow to an underground storm drain piping system to confluence with runoff from Drainage Basin 1. Pipe flows will combine with Drainage Basin 1 pipe flows (downstream of its BMP systems) and exit the site through an existing 18" RCP storm drain pipe that flows out into the public storm drain system in Las Flores Drive.

The BMPs will provide hydromodification management flow control and storm water pollutant control to meet the requirements the California Regional Water Quality Control Board San Diego Region municipal storm water permit (Order No. R9-2013-0001, referred to as MS4 Permit). For detailed pollutant control and HMP calculations refer to the report titled "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for San Marcos Residences" dated March 2021, prepared by Pasco Laret Suiter & Associates.

Area weighted runoff coefficients were calculated using the methodology described in section 3.2.1 of the San Diego County Hydrology Manual and Table 3-1 Runoff Coefficients for Urban Areas. Using the Rational Method Procedure outlined in the San Diego County Hydrology Manual, a peak flow rate was calculated for the proposed condition 100-year, 6-hour storm event. The underground storm water storage facilities provide mitigation for the 100-year 6-hour storm event. A detention analysis was performed to evaluate the effects of the storage facilities on the 100-year, 6-hour storm event peak discharge rates. The following table summarizes the proposed condition hydrologic data.

Summary of Proposed Condition 100-yr Peak Discharge Rates

Drainage Basin ID	Area (ac)	Q100 (cfs) Undetained	Q100 (cfs) Detained
P1 & P2	1.25	5.71	0.69
P3	1.07	6.44	4.02
P4	0.66	2.90	N/A
P5	0.06	0.16	N/A

Refer to the proposed undetained and detained hydrologic calculations and detention analysis included in Sections 3.2, 3.3, 3.4 and Appendix B for detailed analysis.

1.4 Conclusions

Based upon the analyses included in this report, the proposed proprietary biofiltration devices and underground storage facilities are sized to accommodate the increase in peak runoff in the proposed condition and are designed to meet the requirements of the MS4 Permit for both pollutant control and hydromodification management.

1.5 References

"San Diego County Hydrology Manual", revised June 2003, County of San Diego, Department of Public Works, Flood Control Section.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov.

2.0 METHODOLOGY

Pursuant to the San Diego County Hydrology Manual (SDCHM) dated June 2003, the Rational Method is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. The proposed project and associated watershed basins are less than 1 square mile, therefore the Rational Method was used to analyze the project's hydrologic characteristics in the existing and proposed conditions.

2.1 Rational Method

The Rational Method (RM) formula estimates the peak rate of runoff based on the variables of area, runoff coefficient, and rainfall intensity. The rainfall intensity (I) is equal to:

$$I = 7.44 \times P_6 \times D^{-0.645}$$

Where:

I = Intensity (in/hr)
P_6 = 6-hour precipitation (in)
D = duration (min – use Tc)

Using the Time of Concentration (Tc) which is the time required for a given element of water that originates at the most remote point of the basin being analyzed to reach the point at which the runoff from the basin is being analyzed, the RM equation determines the storm water runoff rate (Q) for a given basin in terms of flow, typically in cubic feet per second (cfs). The RM equation is as follows:

$$Q = CIA$$

Where:

Q= flow (cfs)
C = runoff coefficient, ratio of rainfall that produces storm water runoff (runoff vs. infiltration/evaporation/absorption/etc)
I = average rainfall intensity for a duration equal to the Tc for the area (in/hr)
A = drainage area contributing to the basin (ac)

The RM equation assumes that the storm event being analyzed delivers precipitation to the entire basin uniformly, and therefore the peak discharge rate will occur when a raindrop that falls at the most remote portion of the basin arrives at the point of analysis. The RM also assumes that the fraction of rainfall that becomes runoff or the runoff coefficient, C, is not affected by the storm intensity, I, or the precipitation zone number.

2.2 County of San Diego Criteria

The County of San Diego has developed its own tables, nomographs, and methodologies for analyzing storm water runoff for areas within the County. The County has also developed precipitation isopluvial contour maps that show even lines of rainfall anticipated from a given storm event (i.e. 100-year, 6-hour storm). The 100-year 6-hour storm event rainfall isopluvial map is included in Appendix A.

One of the variables of the RM equation is the runoff coefficient, C, which is dependent upon land use and soil type. Table 3-1 Runoff Coefficients for Urban Areas in the SDCHM categorizes the land use, the associated development density (dwelling units per acre) and the percentage of impervious area. Each of the categories listed has an associated runoff coefficient for each soil type class. A composite runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following equation from Section 3.1.2 of the SDCHM:

$$C = 0.90 \times (\%\ \text{Impervious}) + Cp \times (1 - \%\ \text{Impervious})$$

Where: Cp = Pervious Coefficient Runoff Value for the soil type
(shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious)

The onsite hydrologic calculations contained herein figure a composite runoff coefficient for the onsite project areas based on the percentage of impervious area and the percentage of pervious or landscape area. Refer to Appendix A for runoff coefficient calculations.

The County has also illustrated in detail the methodology for determining the time of concentration, in particular the initial time of concentration. The County has adopted the Federal Aviation Agency's (FAA) overland time of flow equation. This equation essentially limits the flow path length for the initial time of concentration to lengths of 100 feet or less, and is dependent on land use and slope.

2.3 AES Rational Method Computer Model

The Rational Method computer program developed by Advanced Engineering Software (AES) satisfies the County of San Diego design criteria, therefore it is the computer model used for this study. The AES hydrologic model is capable of creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points to determine peak flow rates. The program utilizes base information input by the user to perform calculations for up to 15 hydrologic processes. The required base information includes drainage basin area, storm water facility locations and sizes, land uses, flow patterns, and topographic elevations. The hydrologic conditions were analyzed in accordance with the 2003 County of San Diego Hydrology Manual criteria as follows:

Design Storm	100-year, 6-hour
100-year, 6-hour Precipitation	3.3 inches

Rainfall Intensity	Based on the 2003 County of San Diego Hydrology Manual criteria	
Runoff Coefficient*	Pervious C soil	C = 0.30
	Pervious D soil	C =0.35
	Impervious C soil	C = 0.90
	Impervious D soil	C = 0.90
Soil Type	C & D	

*Weighted runoff coefficients were calculated where appropriate. Refer to Appendix A.

3.0 HYDROLOGIC ANALYSIS

Table 1 below compares and summarizes the hydrologic calculations provided in Sections 3.1, 3.2 and 3.4.

Table 1: Summary of 100-yr Peak Discharge Rates

Existing			**Proposed**			**Proposed (Detained)**		
Drainage Basin ID	*Area (ac)*	*Q100 (cfs)*	*Drainage Basin ID*	*Area (ac)*	*Q100 (cfs)*	*Drainage Basin ID*	*Area (ac)*	*Q100 (cfs)*
E1	1.24	2.35	P1 & P2	1.25	5.71	P1 & P2	1.25	0.69
E2	0.04	0.10	P3	1.07	6.44	P3	1.07	4.02
E3	1.65	5.16	P4	0.66	2.90	N/A		
E4	0.12	0.31	P5	0.06	0.16	N/A		

Existing			**Proposed (Detained, Cumulative)**		
Drainage Basin ID	*Area (ac)*	*Q100 (cfs)*	*Drainage Basin ID*	*Area (ac)*	*Q100 (cfs)*
E1, E2 & E3	2.93	**7.61**	P1, P2, P3 & P4	2.98	**7.61**
E4	0.12	0.31	P5	0.06	0.16

3.1 Existing Condition Hydrologic Model Output (100-Year Event)

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                           Analysis prepared by:



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 ************************** DESCRIPTION OF STUDY **************************
* 3527 SOUTH SANTA FE                                                      *
* EXISTING CONDITION                                                       *
* 100-YEAR                                                                 *
 **************************************************************************
----------------------------------------------------------------------------
  FILE NAME: 100PRE.DAT
  TIME/DATE OF STUDY: 15:49 03/01/2022
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    575.97
  DOWNSTREAM ELEVATION(FEET) =    538.97
  ELEVATION DIFFERENCE(FEET) =     37.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.210
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    538.97  DOWNSTREAM(FEET) =    532.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   149.00   CHANNEL SLOPE =  0.0441
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.321
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.64
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.51
  Tc(MIN.) =    8.20
  SUBAREA AREA(ACRES) =     1.11       SUBAREA RUNOFF(CFS) =    2.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       2.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.05
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     249.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   530.34  DOWNSTREAM(FEET) =   528.21
  FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.35
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    8.44
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    57.00
  UPSTREAM ELEVATION(FEET) =    543.68
  DOWNSTREAM ELEVATION(FEET) =    517.12
  ELEVATION DIFFERENCE(FEET) =     26.56
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.047
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.643
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   517.12  DOWNSTREAM(FEET) =   516.53
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.25
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    130.00 =      86.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
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  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    538.13
  DOWNSTREAM ELEVATION(FEET) =    517.74
  ELEVATION DIFFERENCE(FEET) =     20.39
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.431
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.243
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    517.74  DOWNSTREAM(FEET) =    494.68
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0854
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.947
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  85
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.73
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.65
  Tc(MIN.) =    7.08
  SUBAREA AREA(ACRES) =     1.43       SUBAREA RUNOFF(CFS) =    4.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        1.6         PEAK FLOW RATE(CFS) =       5.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.24
  LONGEST FLOWPATH FROM NODE    135.00 TO NODE    145.00 =     370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  UPSTREAM ELEVATION(FEET) =    538.66
  DOWNSTREAM ELEVATION(FEET) =    527.29
  ELEVATION DIFFERENCE(FEET) =     11.37
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  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.898
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =  85
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.31
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.1  TC(MIN.) =      5.00
  PEAK FLOW RATE(CFS)   =       0.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

3.2 Proposed Undetained Condition Hydrologic Model Output (100-Year Event)

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                           Analysis prepared by:
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 ************************** DESCRIPTION OF STUDY **************************
* 3527 SOUTH SANTA FE                                                      *
* PROPOSED CONDITION                                                       *
* 100-YR                                                                   *
 **************************************************************************

  FILE NAME: 100PST.DAT
  TIME/DATE OF STUDY: 10:31 03/02/2022
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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.*

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

```
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    535.41
  DOWNSTREAM ELEVATION(FEET) =    532.13
  ELEVATION DIFFERENCE(FEET) =      3.28
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    532.13  DOWNSTREAM(FEET) =    529.64
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE =  0.0082
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.649
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.96
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.58
  Tc(MIN.) =    7.58
  SUBAREA AREA(ACRES) =     0.96       SUBAREA RUNOFF(CFS) =    4.91
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.770
```

```
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       5.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   2.26
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    7804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   527.39  DOWNSTREAM(FEET) =   526.49
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.17
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    7894.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   521.91  DOWNSTREAM(FEET) =   519.88
  FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.50
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.17
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    8.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    8032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    8.05
  RAINFALL INTENSITY(INCH/HR) =   6.40
  TOTAL STREAM AREA(ACRES) =     1.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.17

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    575.94
  DOWNSTREAM ELEVATION(FEET) =    536.32
  ELEVATION DIFFERENCE(FEET) =     39.62
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.945
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
  SUBAREA RUNOFF(CFS) =      0.65
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.65

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   532.00  DOWNSTREAM(FEET) =   519.88
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.29
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.65
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    220.00 =     132.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    5.99
  RAINFALL INTENSITY(INCH/HR) =   7.74
  TOTAL STREAM AREA(ACRES) =     0.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.17     8.05        6.395         1.01
      2        0.65     5.99        7.738         0.24
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        4.50     5.99       7.738
      2        5.71     8.05       6.395

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.71   Tc(MIN.) =    8.05
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    8032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   519.88  DOWNSTREAM(FEET) =   517.05
  FLOW LENGTH(FEET) =   193.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.57
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.71
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    8.42
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    235.00 =    8225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    82.00
  UPSTREAM ELEVATION(FEET) =    532.03
  DOWNSTREAM ELEVATION(FEET) =    524.56
  ELEVATION DIFFERENCE(FEET) =      7.47
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.420
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  22
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    524.56  DOWNSTREAM(FEET) =    494.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   349.00   CHANNEL SLOPE =  0.0870
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.617
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.11
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.14
  Tc(MIN.) =    6.14
  SUBAREA AREA(ACRES) =     1.03       SUBAREA RUNOFF(CFS) =    6.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       6.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   6.03
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    250.00 =  750349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.45  DOWNSTREAM(FEET) =   491.04
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.86
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.44
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.22
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    255.00 =  750390.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.50  DOWNSTREAM(FEET) =   486.47
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.70
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.44
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.27
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    260.00 =  750429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    270.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    531.96
  DOWNSTREAM ELEVATION(FEET) =    518.31
  ELEVATION DIFFERENCE(FEET) =     13.65
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.428
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    270.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    275.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    518.31  DOWNSTREAM(FEET) =    494.55
  CHANNEL LENGTH THRU SUBAREA(FEET) =   276.00   CHANNEL SLOPE =  0.0861
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.709
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.02
  Tc(MIN.) =    6.02
  SUBAREA AREA(ACRES) =     0.51       SUBAREA RUNOFF(CFS) =    2.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   4.55
  LONGEST FLOWPATH FROM NODE    265.00 TO NODE    275.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    285.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    37.00
  UPSTREAM ELEVATION(FEET) =    531.96
  DOWNSTREAM ELEVATION(FEET) =    527.86
  ELEVATION DIFFERENCE(FEET) =      4.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.066
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    285.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.1  TC(MIN.) =      5.00
  PEAK FLOW RATE(CFS)   =       0.16
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

3.3 Detention Analysis (100-Year Event)

The underground storm water storage facilities (BMPs) provide hydromodification management flow control and mitigation of the 100-year storm event peak flow rate. The 100-year storm event detention analysis was performed using HydroCAD Stormwater Modeling software. The inflow runoff hydrographs to the BMPs were modeled using RatHydro which is a Rational Method Design Storm Hydrograph software that creates a hydrograph using the results of the Rational Method calculations. HydroCAD has the ability to route the 100-year 6-hour storm event inflow hydrograph through the BMPs. Based on the BMP cross sectional geometry, stage storage and outlet structure data, HydroCAD calculates the detained peak flow rate and detained time to peak.

Each underground storm water storage facility has a low-flow orifice to comply with HMP requirements and an overflow weir for larger storm events. Refer to the plans for facility details.

The proposed BMP at the north end of the project site will discharge via proposed storm drain to the east and into the existing public storm drain system within Las Flores Drive. The proposed BMP at the south end of the project site will discharge via proposed storm drain pipe to the south and into the existing public storm drain system within South Santa Fe Drive.

For the proposed detained hydrologic analysis, the effects of the detention provided by the two (2) underground storage facilities were incorporated into the AES analysis. This was done by inserting the results from the HydroCAD analysis, detained peak flow rate and detained time to peak, into the proposed undetained condition AES model to create the proposed detained condition model. Refer to Section 3.4 for the detained AES output.

Based on the results of the HydroCAD analysis, mitigation for the 100-year storm event peak flow rate is provided. Refer to Appendix B for the HydroCAD detention detailed output.

3.4 Proposed Detained Condition Hydrologic Model Output (100-Year Event)

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                           Analysis prepared by:

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                       SAN JUAN CAPISTRANO, CA 92675
                               ph 949.661.6695
                            plsaengineering.com

 ************************** DESCRIPTION OF STUDY **************************
* 3527 SOUTH SANTA FE                                                      *
* PROPOSED CONDITION DETAINED                                              *
* 100-YR                                                                   *
 **************************************************************************

  FILE NAME: 100PSTD.DAT
  TIME/DATE OF STUDY: 11:06 03/02/2022
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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.*
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    535.41
  DOWNSTREAM ELEVATION(FEET) =    532.13
  ELEVATION DIFFERENCE(FEET) =      3.28
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    532.13  DOWNSTREAM(FEET) =    529.64
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE =  0.0082
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.649
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.96
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.58
  Tc(MIN.) =    7.58
  SUBAREA AREA(ACRES) =     0.96       SUBAREA RUNOFF(CFS) =    4.91
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.770
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       5.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   2.26
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =    7804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   527.39  DOWNSTREAM(FEET) =   526.49
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.17
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    7894.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  55.68   RAIN INTENSITY(INCH/HOUR) =  1.84
  TOTAL AREA(ACRES) =     1.01   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   521.91  DOWNSTREAM(FEET) =   519.88
  FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.26
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.30
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   56.22
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    8032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =   56.22
  RAINFALL INTENSITY(INCH/HR) =   1.83
  TOTAL STREAM AREA(ACRES) =     1.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    575.94
  DOWNSTREAM ELEVATION(FEET) =    536.32
  ELEVATION DIFFERENCE(FEET) =     39.62
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.945
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
  SUBAREA RUNOFF(CFS) =      0.65
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.65

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   532.00  DOWNSTREAM(FEET) =   519.88
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.29
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.65
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE    225.00 TO NODE    220.00 =     132.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    5.99
```

```
  RAINFALL INTENSITY(INCH/HR) =   7.74
  TOTAL STREAM AREA(ACRES) =    0.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.30    56.22        1.826         1.01
      2        0.65     5.99        7.738         0.24

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        0.69     5.99       7.738
      2        0.45    56.22       1.826

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.69   Tc(MIN.) =    5.99
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    8032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   519.88  DOWNSTREAM(FEET) =   517.05
  FLOW LENGTH(FEET) =   193.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.19
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    6.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    235.00 =    8225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    82.00
  UPSTREAM ELEVATION(FEET) =    532.03
  DOWNSTREAM ELEVATION(FEET) =    524.56
```

```
  ELEVATION DIFFERENCE(FEET) =      7.47
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.420
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    524.56  DOWNSTREAM(FEET) =    494.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   349.00   CHANNEL SLOPE =  0.0870
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.617
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.11
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.14
  Tc(MIN.) =    6.14
  SUBAREA AREA(ACRES) =     1.03       SUBAREA RUNOFF(CFS) =    6.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =      6.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   6.03
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    250.00 =  750349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.45  DOWNSTREAM(FEET) =   491.04
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.86
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.44
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.22
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    255.00 =  750390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   8.92   RAIN INTENSITY(INCH/HOUR) =  5.99
  TOTAL AREA(ACRES) =     1.07   TOTAL RUNOFF(CFS) =     4.02

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.50  DOWNSTREAM(FEET) =   486.47
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.009
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.94
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.02
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    8.97
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    260.00 =  750429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    270.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    531.96
  DOWNSTREAM ELEVATION(FEET) =    518.31
  ELEVATION DIFFERENCE(FEET) =     13.65
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.428
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
```

```
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    270.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    275.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    518.31  DOWNSTREAM(FEET) =    494.55
  CHANNEL LENGTH THRU SUBAREA(FEET) =   276.00   CHANNEL SLOPE =  0.0861
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.709
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.02
  Tc(MIN.) =    6.02
  SUBAREA AREA(ACRES) =     0.51       SUBAREA RUNOFF(CFS) =    2.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   4.55
  LONGEST FLOWPATH FROM NODE    265.00 TO NODE    275.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    285.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    37.00
  UPSTREAM ELEVATION(FEET) =    531.96
  DOWNSTREAM ELEVATION(FEET) =    527.86
  ELEVATION DIFFERENCE(FEET) =      4.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.066
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    285.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.1  TC(MIN.) =      5.00
  PEAK FLOW RATE(CFS)   =       0.16
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

3.5 Hydromodification Management

To satisfy the requirements of the MS4 Permit, a hydromodification management strategy has been developed for the project based on the Final Hydromodification Management Plan dated March 2011, (Final HMP). A continuous simulation model, the Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) version 5.1, was selected to size mitigation measures. The SWMM model is capable of modeling hydromodification management facilities to mitigate the effects of increased runoff from the post-development conditions and use changes that may cause negative impacts (i.e. erosion) to downstream channels. For HMP calculations refer to the report titled “Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for San Marcos Residences” dated March 2021,, prepared by Pasco Laret Suiter & Associates.

3.6 Storm Water Pollutant Control

To meet the requirements of the MS4 Permit, the Modular Wetlands Systems are designed to treat onsite storm water pollutants for the 24-hour, 85th percentile storm event. For detailed pollutant control calculations refer to the report titled ““Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for San Marcos Residences” dated March 2021,, prepared by Pasco Laret Suiter & Associates.

APPENDIX A

Hydrology Support Material

San Marcos Residences
PLSA Project No. 3527
3/4/2022

C = 0.9(%Impervious)+Cp(1 - %Impervious)

Runoff Coefficient Table		
Soil Type	C	D
Impervious	0.9	0.9
Pervious, Cp	0.3	0.35

PRE-PROJECT CONDITION						
Drainage Basin ID	**Total Area (sf)**	**Soil Type**	**Impervious Area (sf)**	**Pervious Area (sf)**	**% Impervious**	**Weighted Runoff Coefficient, C**
E1	53762	C	0	53762	0	0.30
E2	1834	C	0	1834	0	0.30
E3	71987	D	12919	59068	17.9%	0.45
E4	5243	C	0	5243	0	0.30

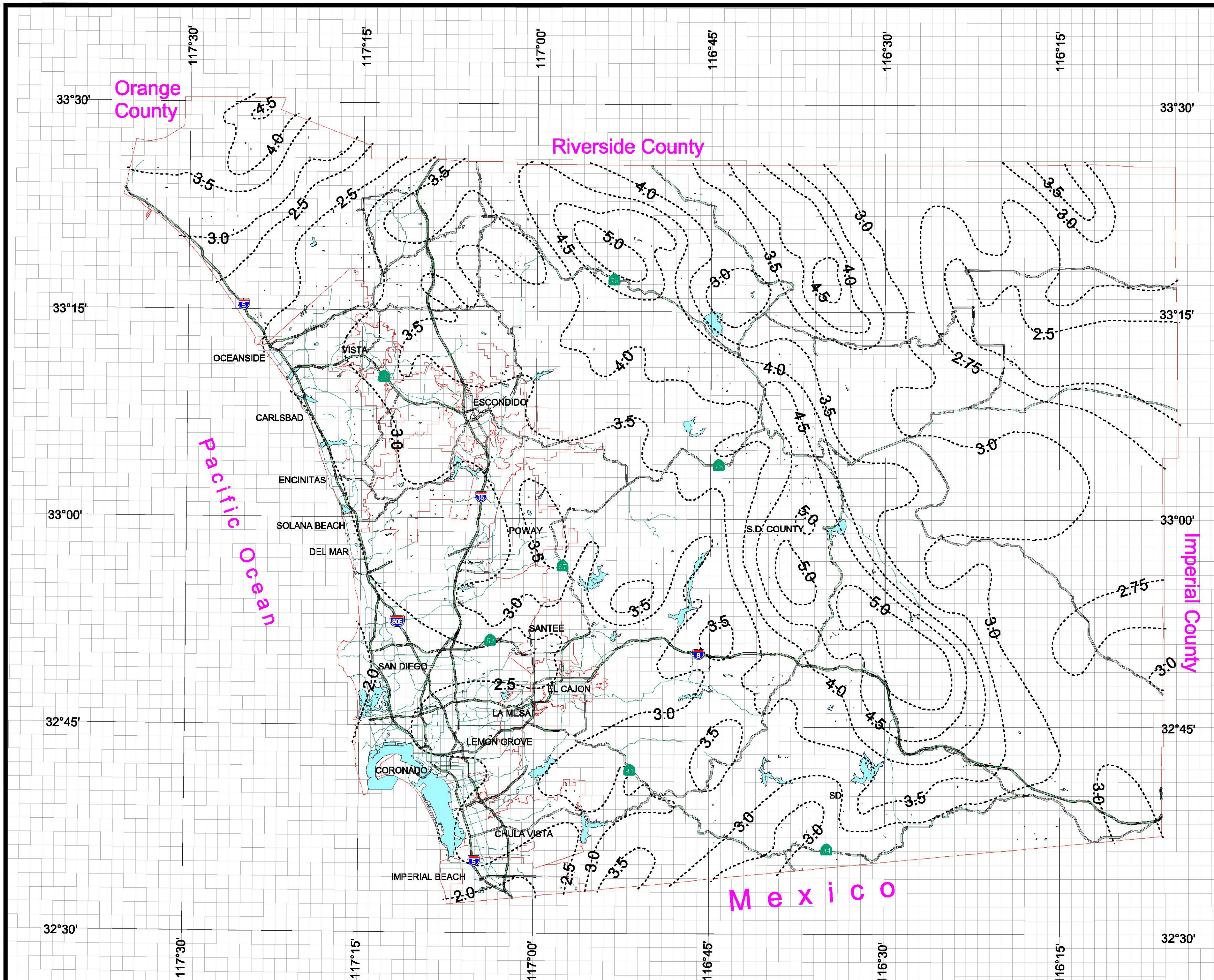
POST-PROJECT CONDITION						
Drainage Basin ID	**Total Area (sf)**	**Soil Type**	**Impervious Area (sf)**	**Pervious Area (sf)**	**% Impervious**	**Weighted Runoff Coefficient, C**
P1	43998	C	34828	9170	79.2%	0.77
P2	10531	C	829	9702	7.9%	0.35
P3	46587	D	37689	8898	80.9%	0.79
P4	28583	D	11520	17063	40.3%	0.57
P5	2470	C	0	2470	0.0%	0.30

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



DPW GIS
Department of Public Works Geographic Information Services

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We Have San Diego Covered!

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

San Diego County Area, California

July 27, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (2972/2982 South Santa Fe Avenue)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group (2972/2982 South Santa Fe Avenue)

Map Scale: 1:1,060 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 24, 2020—Feb 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group (2972/2982 South Santa Fe Avenue)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DaD	Diablo clay, 9 to 15 percent slopes, warm MAAT	C	1.7	72.6%
HrC	Huerhuero loam, 2 to 9 percent slopes	D	0.6	27.4%
Totals for Area of Interest			**2.3**	**100.0%**

Rating Options—Hydrologic Soil Group (2972/2982 South Santa Fe Avenue)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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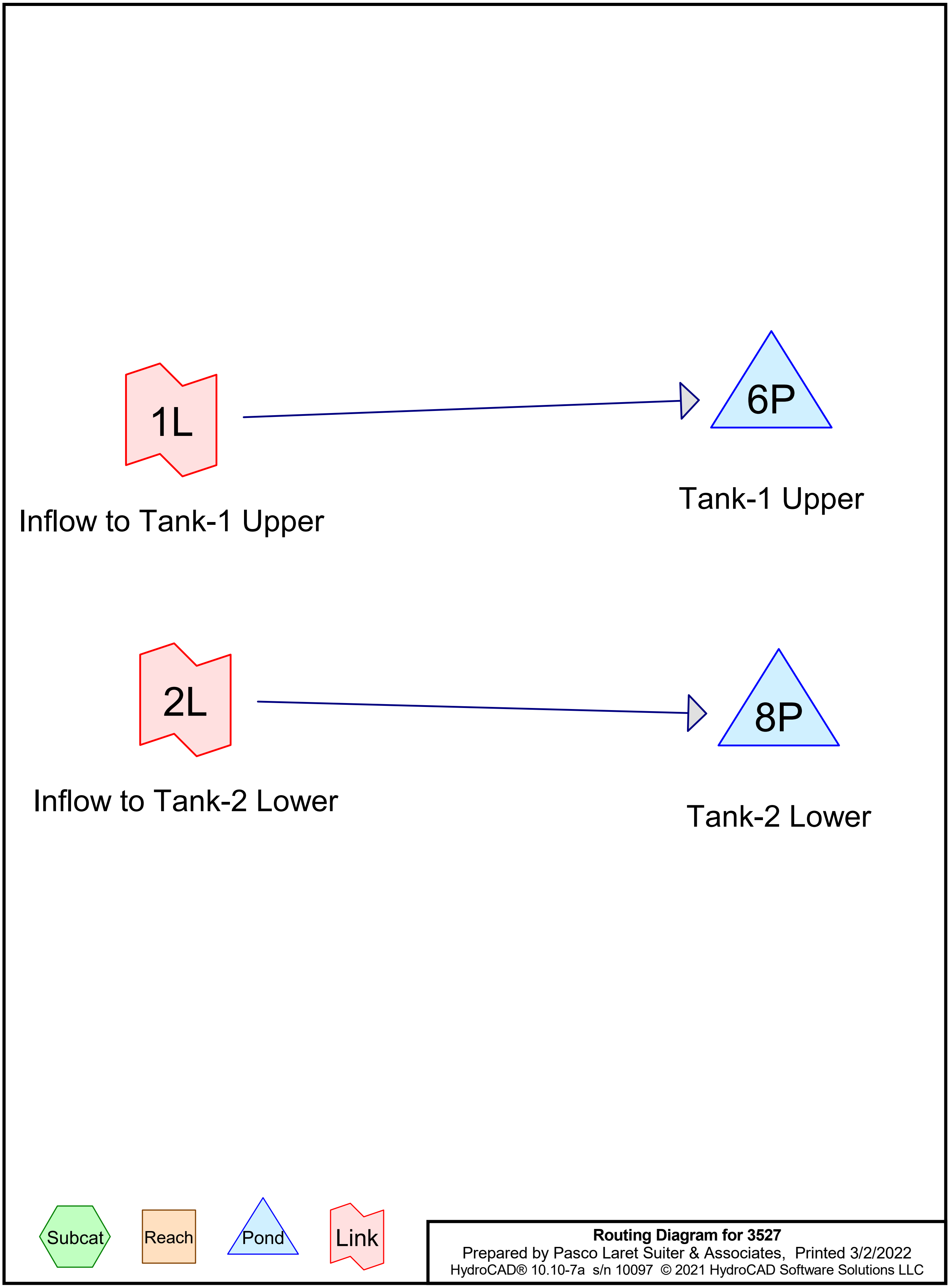
APPENDIX B

Detention Support Material



Routing Diagram for 3527
Prepared by Pasco Laret Suiter & Associates, Printed 3/2/2022

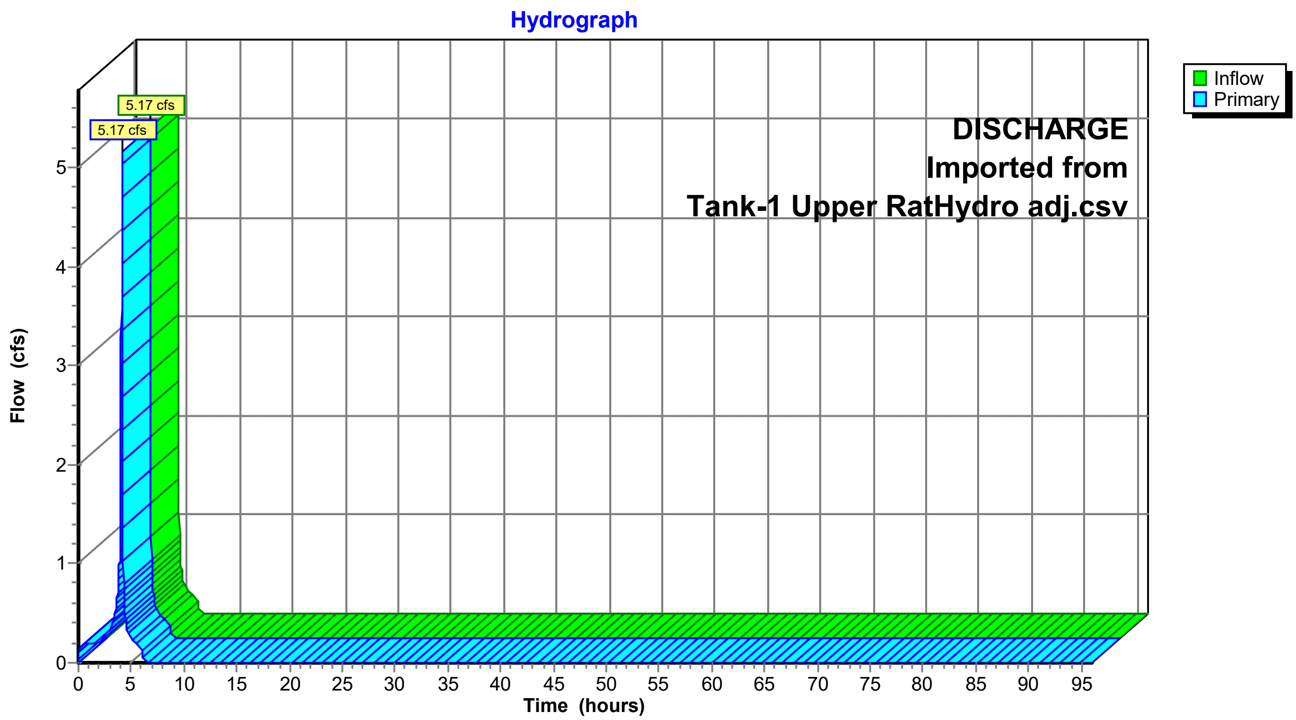
Summary for Link 1L: Inflow to Tank-1 Upper

Inflow = 5.17 cfs @ 4.13 hrs, Volume= 0.216 af
Primary = 5.17 cfs @ 4.13 hrs, Volume= 0.216 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 6P : Tank-1 Upper

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

DISCHARGE Imported from Tank-1 Upper RatHydro adj.csv

Link 1L: Inflow to Tank-1 Upper



Summary for Pond 6P: Tank-1 Upper

Inflow	=	5.17 cfs @	4.13 hrs, Volume=	0.216 af	
Outflow	=	0.30 cfs @	4.93 hrs, Volume=	0.214 af,	Atten= 94%, Lag= 47.9 min
Primary	=	0.30 cfs @	4.93 hrs, Volume=	0.214 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 105.13' @ 4.93 hrs Surf.Area= 1,600 sf Storage= 7,805 cf

Plug-Flow detention time= 1,616.3 min calculated for 0.214 af (99% of inflow)
Center-of-Mass det. time= 1,615.9 min (1,828.4 - 212.5)

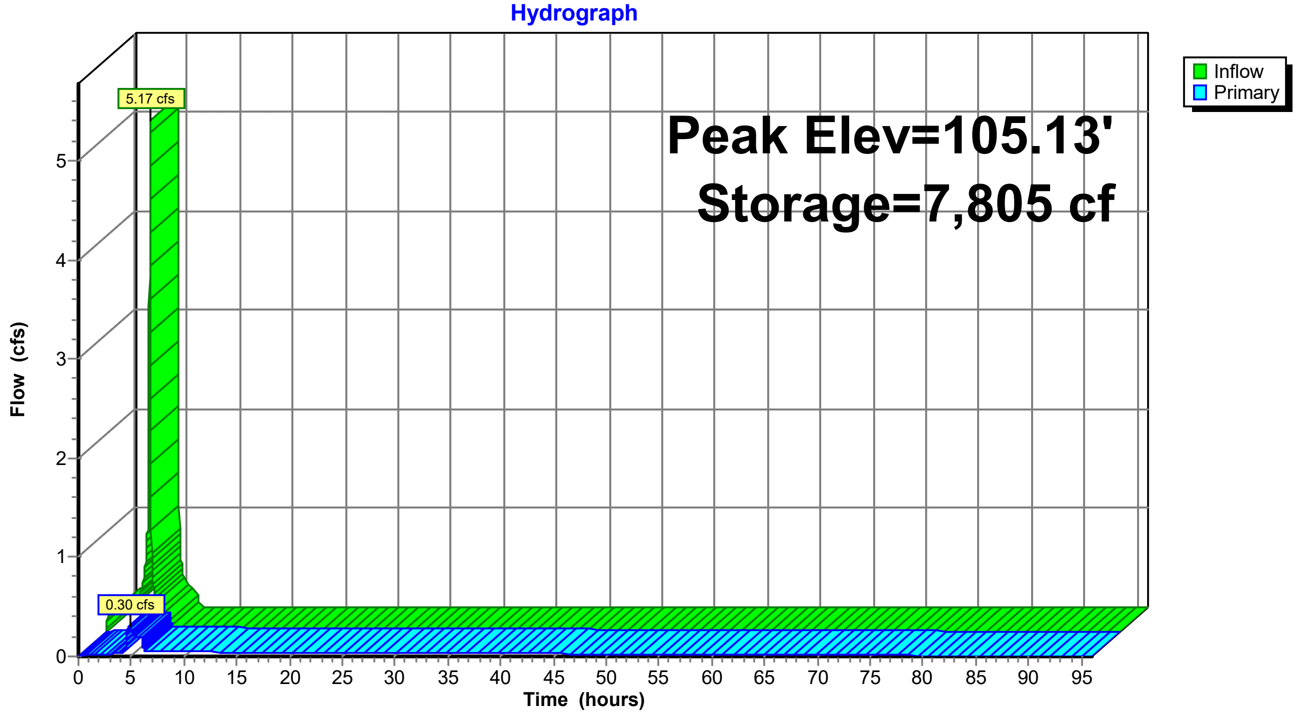
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	8,482 cf	**Tank-1 Upper (Conic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	1,600	0.0	0	0	1,600
101.00	1,600	95.0	1,520	1,520	1,742
102.00	1,600	95.0	1,520	3,040	1,884
103.00	1,600	95.0	1,520	4,560	2,025
104.00	1,600	95.0	1,520	6,080	2,167
105.00	1,600	95.0	1,520	7,600	2,309
105.08	1,600	95.0	122	7,722	2,320
105.58	1,600	95.0	760	8,482	2,391

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**12.00" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 100.00' / 99.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	100.00'	**0.90" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.08'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 0.50 Width (feet) 6.00 6.00 0.00

Primary OutFlow Max=0.30 cfs @ 4.93 hrs HW=105.13' (Free Discharge)
└─**1=Culvert** (Passes 0.30 cfs of 6.86 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.05 cfs @ 10.87 fps)
  └─**3=Custom Weir** (Weir Controls 0.25 cfs @ 0.77 fps)

Pond 6P: Tank-1 Upper



Summary for Link 2L: Inflow to Tank-2 Lower

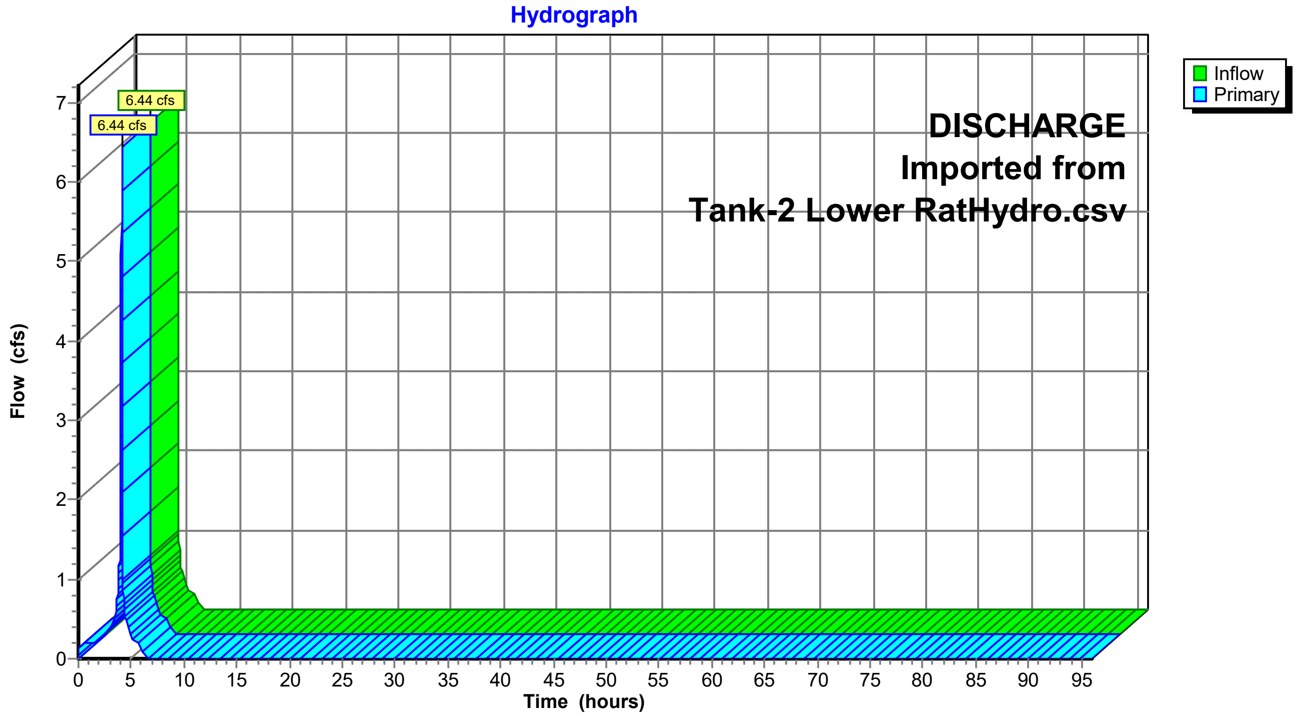
Inflow	=	6.44 cfs @	4.10 hrs, Volume=	0.233 af
Primary	=	6.44 cfs @	4.10 hrs, Volume=	0.233 af, Atten= 0%, Lag= 0.0 min

Routed to Pond 8P : Tank-2 Lower

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

DISCHARGE Imported from Tank-2 Lower RatHydro.csv

Link 2L: Inflow to Tank-2 Lower



Summary for Pond 8P: Tank-2 Lower

Inflow	=	6.44 cfs @	4.10 hrs, Volume=	0.233 af
Outflow	=	4.02 cfs @	4.14 hrs, Volume=	0.231 af, Atten= 38%, Lag= 2.7 min
Primary	=	4.02 cfs @	4.14 hrs, Volume=	0.231 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 103.35' @ 4.14 hrs Surf.Area= 2,100 sf Storage= 6,686 cf

Plug-Flow detention time= 1,202.2 min calculated for 0.231 af (99% of inflow)
Center-of-Mass det. time= 1,201.2 min (1,413.6 - 212.4)

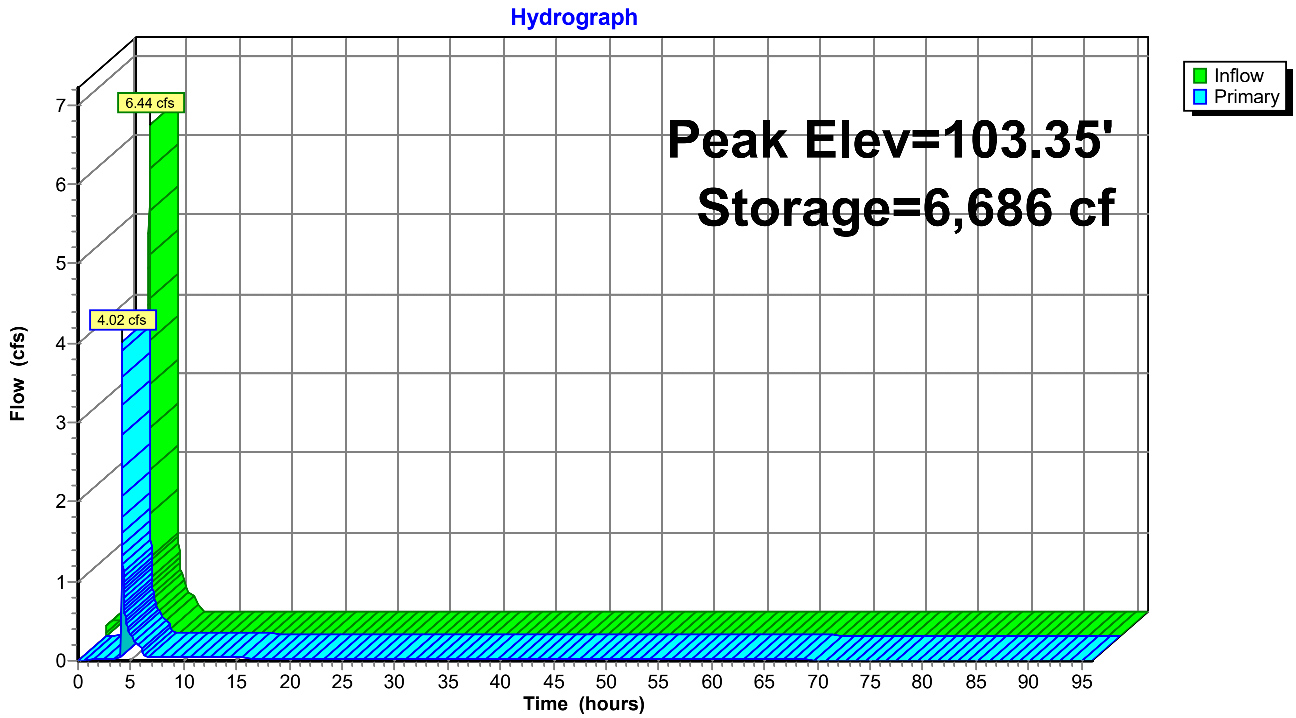
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	7,062 cf	**Tank-2 Lower (Conic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	2,100	0.0	0	0	2,100
101.00	2,100	95.0	1,995	1,995	2,262
102.00	2,100	95.0	1,995	3,990	2,425
103.00	2,100	95.0	1,995	5,985	2,587
103.04	2,100	95.0	80	6,065	2,594
103.54	2,100	95.0	998	7,062	2,675

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**12.00" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 100.00' / 99.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	100.00'	**0.90" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	103.04'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 0.50 Width (feet) 7.00 7.00 0.00

Primary OutFlow Max=3.99 cfs @ 4.14 hrs HW=103.35' (Free Discharge)
└─**1=Culvert** (Passes 3.99 cfs of 5.54 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.04 cfs @ 8.76 fps)
  └─**3=Custom Weir** (Weir Controls 3.95 cfs @ 1.82 fps)

Pond 8P: Tank-2 Lower



APPENDIX C

Existing and Proposed Hydrology Maps

PRE-PROJECT HYDROLOGY MAP

SAN MARCOS RESIDENCES

AREA CALCULATIONS

DRAINAGE BASIN E1 TOTAL AREA = 53,762 SF
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 53,762 SF
PERCENT IMPERVIOUS = 0%
SOIL CLASSIFICATION = C
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.30
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.00)+0.30(1-0.00) = 0.30

DRAINAGE BASIN E2 TOTAL AREA = 1,834 SF
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 1,834 SF
PERCENT IMPERVIOUS = 0%
SOIL CLASSIFICATION = C
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.30
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.00)+0.30(1-0.00) = 0.30

DRAINAGE BASIN E3 TOTAL AREA = 71,987 SF
IMPERVIOUS AREA = 12,919 SF
PERVIOUS AREA = 59,068 SF
PERCENT IMPERVIOUS = 18%
SOIL CLASSIFICATION = D
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.35
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.18)+0.35(1-0.18) = 0.45

DRAINAGE BASIN E4 TOTAL AREA = 5,243 SF
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 5,243 SF
PERCENT IMPERVIOUS = 0%
SOIL CLASSIFICATION = C
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.30
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.00)+0.30(1-0.00) = 0.30

LEGEND

RIGHT OF WAY
PROPERTY BOUNDARY
BASIN BOUNDARY
SUBAREA BOUNDARY
EXISTING CONTOURS
LIMITS OF EXISTING BUILDING
LIMITS OF EXISTING AC PAVEMENT
STREET CENTERLINE
SURFACE DRAINAGE PATH
UNDERGROUND PIPE DRAINAGE PATH
STORM DRAINAGE PIPE

SCALE: 1" = 20'
20 10 0 20 40 60

PRE-PROJECT HYDROLOGY MAP
SAN MARCOS RESIDENCES
CITY OF SAN MARCOS

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

POST-PROJECT HYDROLOGY MAP

SAN MARCOS RESIDENCES

AREA CALCULATIONS

DRAINAGE BASIN P1 TOTAL AREA = 43,998 SF
IMPERVIOUS AREA = 34,828 SF
PERVIOUS AREA = 9,170 SF
PERCENT IMPERVIOUS = 79.2%
SOIL CLASSIFICATION = C
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.30
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.792)+0.30(1-0.792) = 0.77

DRAINAGE BASIN P2 TOTAL AREA = 10,531 SF
IMPERVIOUS AREA = 829 SF
PERVIOUS AREA = 9,702 SF
PERCENT IMPERVIOUS = 7.9%
SOIL CLASSIFICATION = C
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.30
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.079)+0.30(1-0.079) = 0.35

DRAINAGE BASIN P3 TOTAL AREA = 46,587 SF
IMPERVIOUS AREA = 37,689 SF
PERVIOUS AREA = 8,898 SF
PERCENT IMPERVIOUS = 80.9%
SOIL CLASSIFICATION = D
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.35
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.809)+0.35(1-0.809) = 0.79

DRAINAGE BASIN P4 TOTAL AREA = 28,583 SF
IMPERVIOUS AREA = 11,520 SF
PERVIOUS AREA = 17,063 SF
PERCENT IMPERVIOUS = 40.3%
SOIL CLASSIFICATION = D
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.35
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.403)+0.35(1-0.403) = 0.57

DRAINAGE BASIN P5 TOTAL AREA = 2,470 SF
IMPERVIOUS AREA = 0 SF
PERVIOUS AREA = 2,470 SF
PERCENT IMPERVIOUS = 0%
SOIL CLASSIFICATION = C
Cp (PER TABLE 3-1 OF THE SDCHM) = 0.30
C = 0.9(% IMPERVIOUS) + Cp(1-% IMPERVIOUS) = 0.9(0.00)+0.30(1-0.00) = 0.30

LEGEND

- RIGHT OF WAY
- PROPERTY BOUNDARY
- BASIN BOUNDARY
- EXISTING CONTOURS
- LIMITS OF EX. BUILDING
- LIMITS OF PROP. BUILDING
- LIMITS OF EX. OR PROP. CONCRETE/PAVEMENT
- STREET CENTERLINE
- SURFACE DRAINAGE PATH
- UNDERGROUND PIPE DRAINAGE PATH
- EX. STORM DRAINAGE PIPE
- PROP. STORM DRAINAGE PIPE
- PROP. UNDERGROUND DETENTION SYSTEM

SCALE: 1" = 20'

20 10 0 20 40 60

POST-PROJECT HYDROLOGY MAP
SAN MARCOS RESIDENCES
CITY OF SAN MARCOS

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