February 18th, 2021

PRELIMINARY

HYDROLOGY STUDY

For

French Valley Development

Highway 79 & Briggs Road
Murrieta, CA 92563

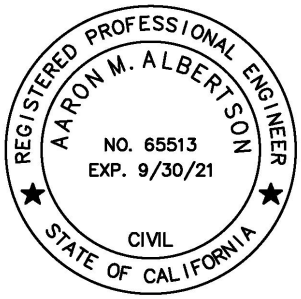
Prepared for:

DMSD Property, LLC
41856 Ivy Street, Suite 201
Murrieta, CA 92562
Tel: (951) 816-0189

Prepared by:

Commercial Development Resources
Today's Ideas. Tomorrow's Reality.

4121 Westerly Place, Suite 112
Newport Beach CA 92660
Tel: (949) 610-8997



Aaron M. Albertson, P.E.
R.C.E. 65513, Exp. 09/30/21

TABLE OF CONTENTS

SECTIONS

ATTACHMENTS

I. INTRODUCTION

Background/Purpose

The purpose of this study is to determine the incremental increase from existing and proposed site condition for comparison purposes. Stormwater runoff for 2, 10, and 100-year storm events are analyzed for a proposed commercial development in the unincorporated area of Riverside County (see vicinity map in Attachment 1). Runoff results will be used to size the new storm drain system. This study also demonstrates the mitigation measures to reduce the increased flows due to the project site developments. Project site runoff will be treated prior to releasing to downstream water courses to satisfy Low Impact Development (LID) requirements. The development is being completed by DMSD Property, LLC. The project site is located at the intersection of Briggs Road and Highway 79 (Winchester Road) and the APN is 963-070-052. The project site is bounded by Benton Crossing development to the north, Briggs Road to the east, undeveloped land to the south, and Highway 79 (Winchester Road) to the east. The project site and studied area consists of 2.17 acres (94,330 sq-ft).

The project site is currently an undeveloped, vacant lot. There is an existing storm drain drop inlet at the northwestern property line along Highway 79. This connects to the adjacent storm drain inlet in the public right-of-way and discharges across the highway. The public storm drain system is owned by the County of Riverside. Existing utilities will remain protected in place as required. The project proposes to construct two new quick service restaurants (Jack in the Box and Taco Bell) with one drive-thru lane each. Proposed site improvements include AC pavement parking lot, concrete hardscape, an underground detention and storm drain system, biofiltration basins for water quality treatment, two covered trash enclosures, incidental utilities, and new landscape areas throughout the site.

The project site is located within the Santa Margarita Watershed within Riverside County. The County owns the storm drain system that project runoff flows to. Runoff flows to Warm Springs Creek, Murrieta Creek, Santa Margarita (Upper), Santa Margarita (Lower), Santa Margarita Estuary, then ultimately discharges to the Pacific Ocean.

II. DESIGN CRITERIA AND ASSUMPTIONS

Hydrology Methodology

As recommended in the Riverside County Flood Control and Water Conservation District Hydrology Manual, the rational method was used to calculate the design discharge for the local drainage areas since the watershed area to the proposed storm drain systems is less than one square mile. Hydrologic calculations to determine the 2-year, 10-year and 100-year discharges at critical locations were performed using the Riverside County Rational Method. A technical description of the rational method is provided in the Hydrology Manual dated April 1978.

The hydrology calculations are based on the Riverside County Hydrology Program, as incorporated by Advanced Engineering Software (AES) for determining peak runoff. The equations, charts, precipitation data, rainfall intensity curves used are from the Hydrology Manual. The rational method was used to calculate the 2-year, 10-year and 100-year storm frequency peak flow rates for a 1-hour storm event. The design discharges were computed by generating a hydrologic "link-node" model which divides the area into subareas, each tributary to a concentration point or hydrologic "node" point determined by the proposed site layout. The results of the hydrologic calculations were used to design the required storm drain facilities.

Hydrologic parameters used in the analysis include:

Soil type

Hydrologic soil ratings are based on a scale of A through D, where A is the most pervious, providing the least runoff. Per the soil map from NRCS (see Attachment 1), the study area consists of Soil Type C soil.

1-hour rainfall precipitation

Per NOAA Atlas 14, Vol. 6, Version 2 (see Attachment 1) the 2-year, 1-hour rainfall precipitation is 0.50 in and the 100-year, 1-hour rainfall is 1.20 in.

Slope of intensity duration curve

Per RCFCD Hydrology Manual (Plate D-4.6), the slope of the intensity duration curve is assumed to be 0.56 for the studied area.

Antecedent Moisture Condition (AMC)

Per RCFCD Hydrology Manual (page C-3 & 4), AMC I was used for 2-year storm, AMC II for 10-year storm and 100-year design storm in the hydrology analysis.

III. DISCUSSION

A. Existing Condition

The existing site is an undeveloped lot with minimal ground cover and type C soils. The studied area for existing condition is 2.17 acres and consists of 1 drainage area (DA-A). The existing condition analysis includes runoff flowing outside project site limits. Runoff in the studied area sheet flows northwest to the existing storm drain drop inlet along Highway 79 at slopes between 0.5% and 5%. This discharges project site runoff into the 18" RCP County's storm drain line. See County's storm drain plan in Attachment 1. The storm drain line discharges runoff to the west across Highway 79. The existing project site consists of 100% pervious area that was previously graded. Some scattered trash and debris, as well as gravel and cobbles, etc., also exist over portions of the surface of the site, which is mostly covered by wild grasses, weeds, and other short vegetation.

A map of the existing drainage patterns and detailed hydrology calculations are included in Attachment 2 of this report. A summary of hydrologic calculation results for the existing condition is included in Table 1 (next page).

B. Proposed Condition

The proposed project site will be developed as a commercial lot with two new quick service restaurants with one drive-thru lane each and onsite parking. The studied area for proposed condition is 2.17 acres and consists of 1 drainage area (DA-A) with 10 subareas. Drainage subareas are separated based on water quality treatment system capacities and surface types. Runoff will sheet flow to biofiltration basins or a proprietary biofiltration system for water quality treatment, then discharge to an underground detention system for hydromodification flow control. Runoff from the building roofs will be collected by a roof down drain and surface flow to an onsite inlet or basin. Flows will be discharged to the existing onsite drop inlet and follow the existing drainage pattern. The biofiltration basins and proprietary biofiltration system are sized to meet LID design capture volume (DCV) requirements for the entire project site. The proposed project site will consist of 55% impervious and 45% pervious areas.

Runoff from subareas A1 and A2 flow to a proprietary biofiltration system (Modular Wetland System) located along the eastern property line in the southern portion of the lot. This includes runoff from a portion of the new south building roof, trash enclosure roof, landscape, AC pavement and concrete hardscape areas. Runoff from subareas A3 and A4 flows to a bioretention basin adjacent to the southern-most drive-thru lane. This includes runoff from a portion of the southern-most building roof, trash enclosure roof, landscape, AC pavement and concrete hardscape areas. Runoff from subarea A5 flows to a bioretention basin along the eastern property line, south of the middle drive

entrance. This includes runoff from a portion of the southern-most building roof, landscape, AC pavement and concrete hardscape areas. Runoff from subareas A6, A7, A8 and A9 flows to a biofiltration basin adjacent to the northern-most drive-thru lane. This includes runoff from a portion of the northern-most building roof, trash enclosure roof, landscape, AC pavement and concrete hardscape areas. Subarea A10 consists of self-treating landscaped area with runoff flowing directly to the existing storm drain drop inlet at the norther property line. Flows from this subarea are not routed to the onsite treatment BMPs or hydromodification control facility.

A map of the proposed drainage patterns and detailed hydrology calculations are included in Attachment 3 of this report. A summary of hydrologic calculation results for the proposed condition is included in Table 1 (below).

Table 1 – Hydrology Analysis Summary

Drainage Area	Existing Condition				Proposed Condition (Unmitigated)				Difference (Proposed – Existing)			
	Area (ac)	2-yr (cfs)	10-yr (cfs)	100-yr (cfs)	Area (ac)	2-yr (cfs)	10-yr (cfs)	100-yr (cfs)	Area (ac)	2-yr (cfs)	10-yr (cfs)	100-yr (cfs)
DA-A	2.17	1.05	1.97	3.30	2.17	2.44	4.06	6.32	0.00	1.39	2.09	3.02
TOTAL	2.17	1.05	1.97	3.30	2.17	2.44	4.06	6.32	0.00	1.39	2.09	3.02

The site will be graded to direct project flows to the proposed water quality treatment systems. The treated runoff and overflows discharge to the detention basin prior to joining the existing storm drain at the existing onsite drop inlet. The water quality treatment and flow mitigation measures are provided for the project site. The incorporation of impervious surfaces and proposed developments will result in the increases of peak flow rates and storm runoff volumes, but the proposed underground detention tank will mitigate the increases. The area to be developed is not anticipated to affect the overall drainage characteristics or patterns of the site.

C. Water Quality and Hydromodification Considerations

The storm water peak flow rates and volumes are expected to increase due to the project developments and increase in impervious area. The underground detention system with an outlet control structure is proposed to mitigate the flow increases. The biofiltration basin and Modular Wetland System will fulfill the LID water quality treatment requirements.

Due to the hydromodification flow control requirement and small size of project site, unit hydrographs were not performed for this project. The County hydromodification worksheets are used to determine a size for the detention vault to mitigate for water

quality and increase in runoff. The detailed flow control calculations can be found in the Section 4 of this report. The County worksheet results indicate that the proposed detention vault meets the hydromodification mitigation requirements. Biofiltration basin, Modular Wetland System, and detention vault details are provided in Section 4. The detailed basin size and volume can be found in the WQMP report.

IV. CONCLUSION

The project's storm drain HDPE pipe network will be sized using flows from the 100-year storm event. Storm drain inlet and pipe sizing calculations will be included in Attachment 5 of the Final Hydrology Study. The project's proposed treatment BMPs are sized based on the LID water quality treatment requirements. The detention vault is sized based on Santa Margarita's hydromodification flow control requirements. The project site will be constructed so that runoff is conveyed to the underground detention system prior to discharging to the public storm drain system. The primary overflow is the existing drop inlet in the northwest property corner. The secondary overflow is the area drain in the landscaping along the northern property line. Overflows will bubble up and surface flow west onto Highway 79 and into the County's storm drain system.

The total unmitigated storm runoff flow rate at will increase by approximately 132% for a 2-year storm, 106% for a 10-year storm, and 92% for a 100-year storm event. This is because the project is proposing development of a vacant, undeveloped lot to one with paved parking, new buildings, and impervious sidewalks. However, all project site runoff will be captured, treated, detained onsite, and slowly released to the County's storm drain system. This will reduce the runoff for the proposed mitigated condition. Therefore, downstream channels and conveyance system will not be at risk of increased erosion due to project site developments.

V. REFERENCES

1. Riverside County Flood Control and Water Conservation District Hydrology Manual (1978).

2. Advanced Engineering Software (AES), © 1982-2016 Version 23.0, Riverside County Flood Control & Water Conservation District (RCFC&WCD) 1978 Hydrology Manual.

ATTACHMENT 1

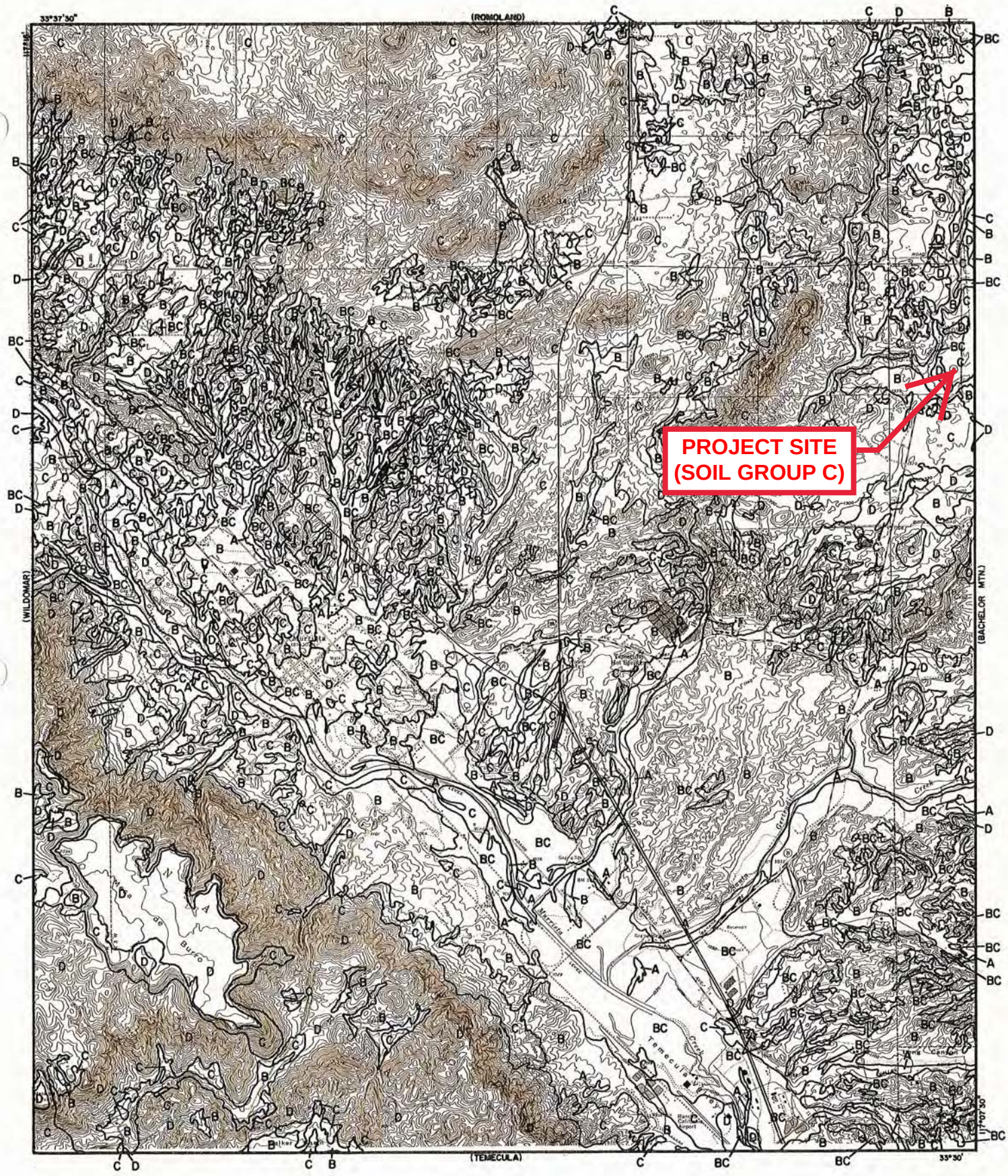
Vicinity Map
County Soils Map
Intensity-Duration Curve
County Precipitation Maps

VICINITY MAP

JIB French Valley

Highway 79 & Briggs Road
Winchester, CA 92596

(N.T.S.)



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

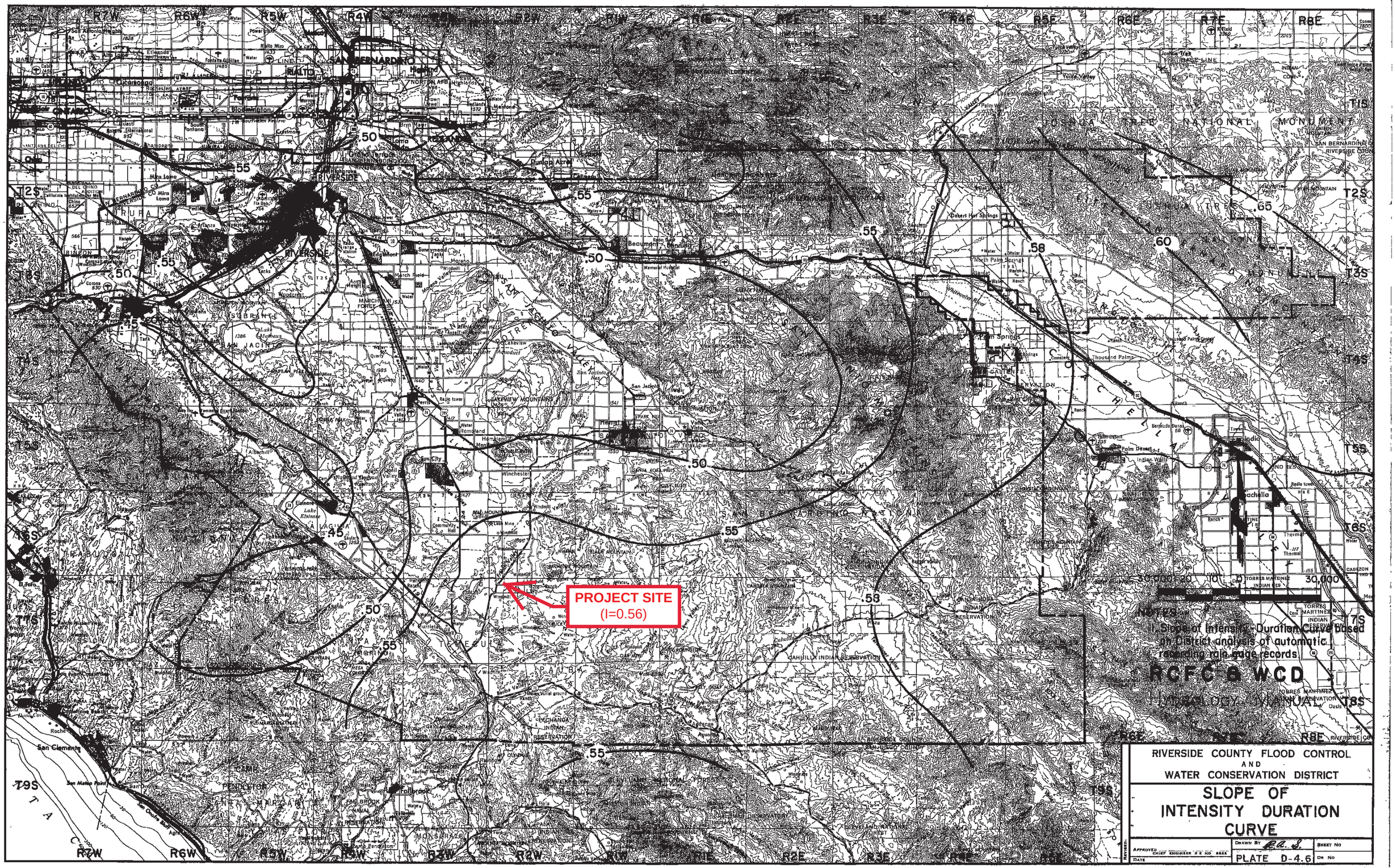
HYDROLOGY MANUAL

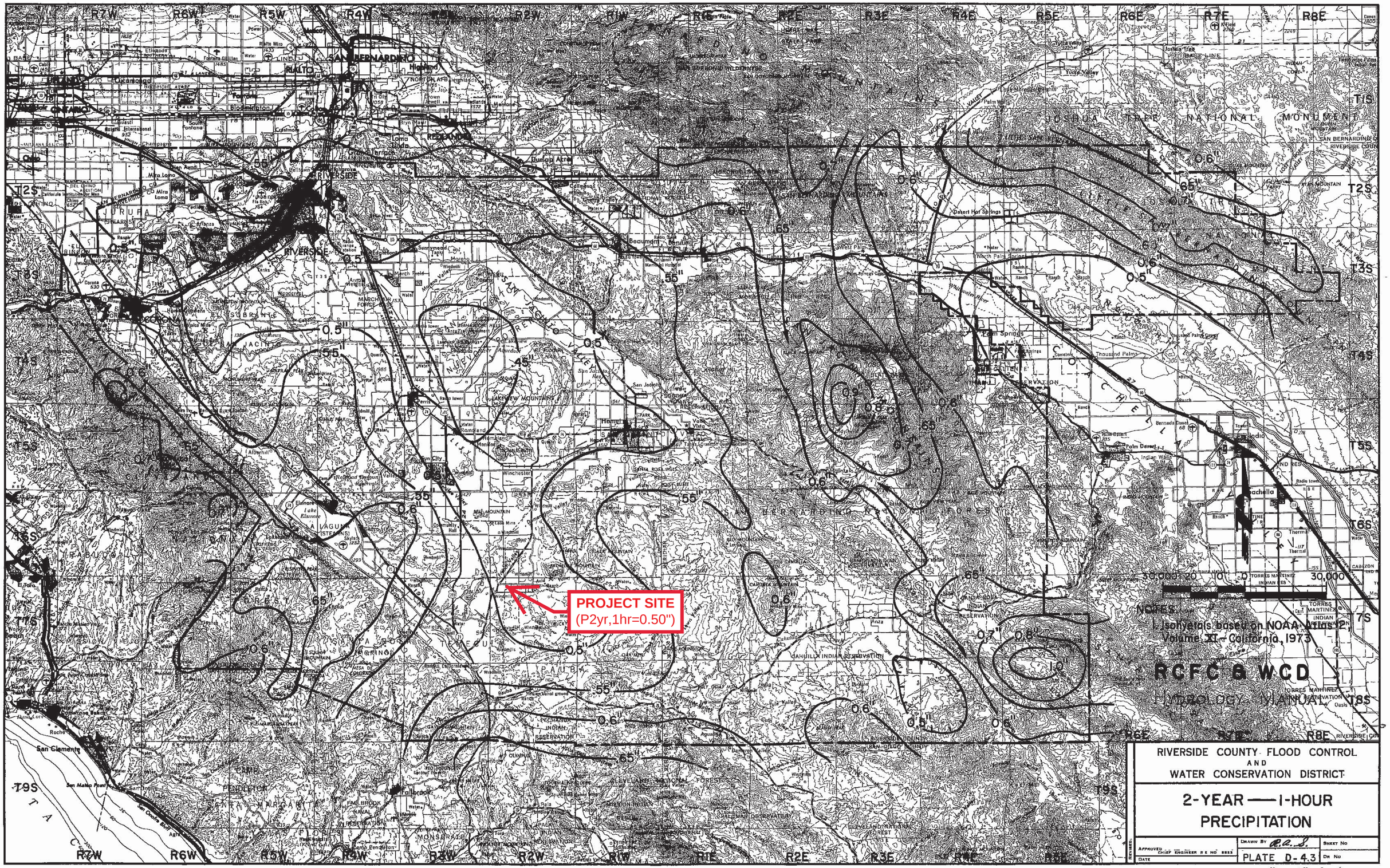
N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR MURRIETA

PLATE C-1.52


PROJECT SITE
(I=0.56)
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION CURVE
PLATE D-4.6
DRAWN BY
SHEET NO
APPROVED CHIEF ENGINEER R.E. NO. 8824
DATE
DR. NO
REVISED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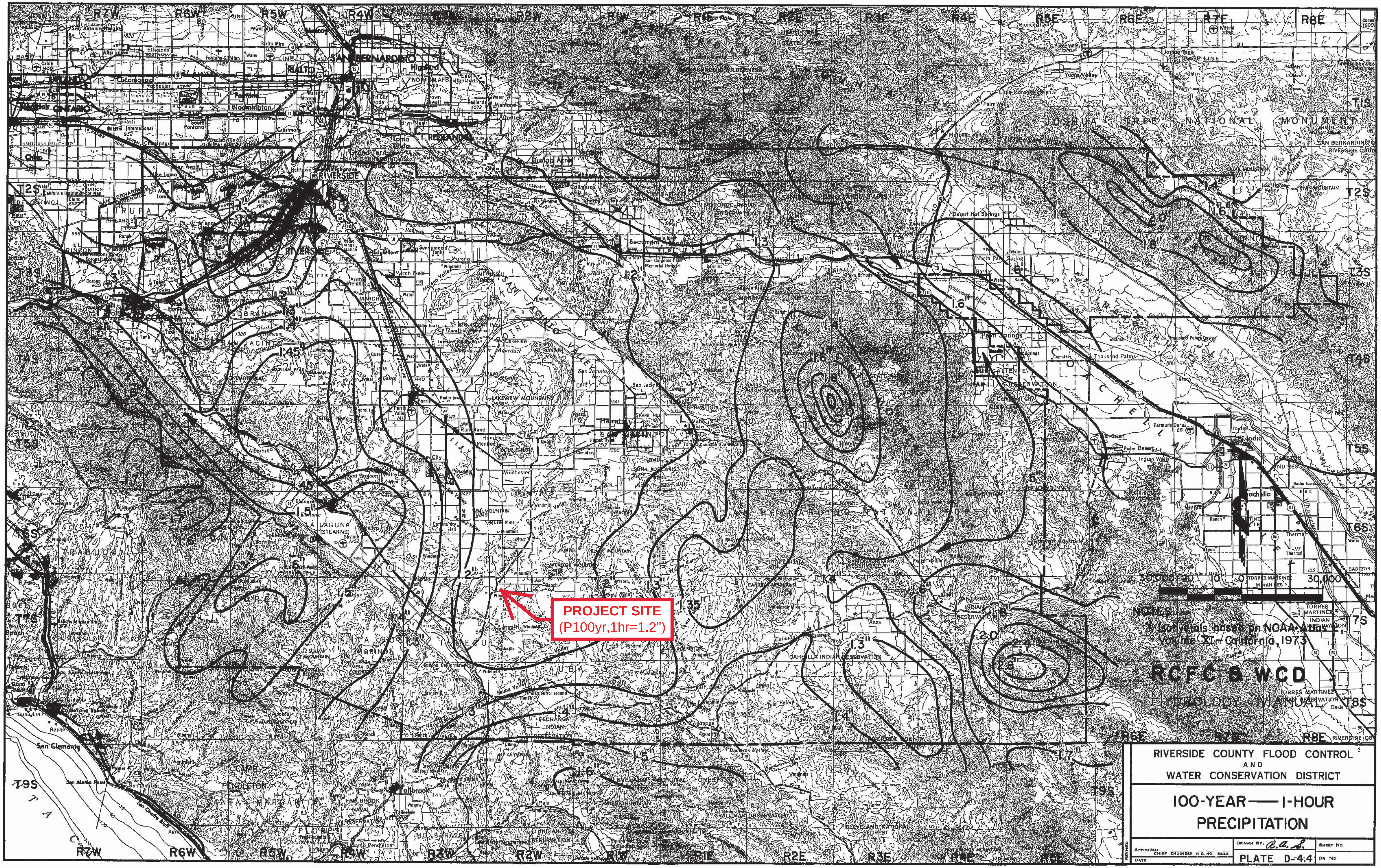
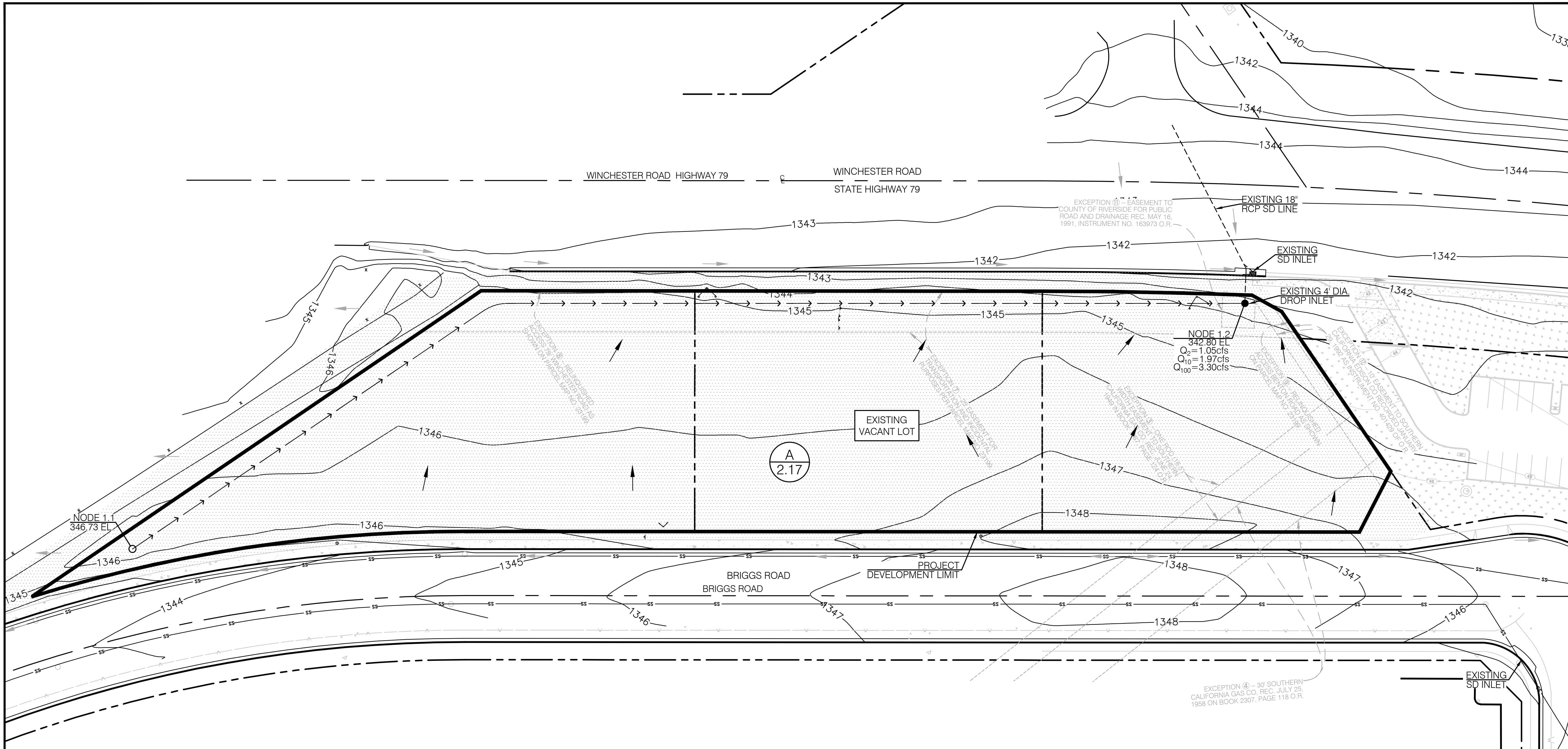
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.3
SAN BERNARDINO
RIVERSIDE
RIALTO
JOSHUA TREE NATIONAL MONUMENT
PALM SPRINGS
SAN JACINTO
HEMET
TEMECULA
MURRIETA
CORONA
SAN CLEMENTE
FALLBROOK
INDIO
COACHELLA
LAKE ELSINORE
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S


PROJECT SITE
(P100yr,1hr=1.2")
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR —— 1-HOUR
PRECIPITATION
PLATE D-4.4
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO
RIVERSIDE
REDLANDS
Beaumont
Hemet
San Clemente
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S

ATTACHMENT 2

Existing Drainage Map & Runoff Calculations



LEGEND:

- A.C. PAVEMENT
- CONCRETE
- NATURAL COVER
- DRAINAGE AREA (DA) BOUNDARY
- PROPERTY LINE
- CENTERLINE
- # / # DRAINAGE AREA ID SIZE (ACRES)
- EXISTING SD LINE
- FLOWPATH

0 60 120

GRAPHIC SCALE
SCALE: 1"= 60'

PREPARED FOR:

DMSD PROPERTY, LLC
41760 IVY STREET, SUITE 201
MURRIETA, CA 92562
TEL: (951) 816-0189

PREPARED BY:

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Today's Ideas. Tomorrow's Reality

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NEWPORT BEACH, CA 92660
CONTACT: AARON ALBERTSON, PE
TEL: (949) 610-8997

HYDROLOGY EXHIBIT: EXISTING DRAINAGE MAP

FRENCH VALLEY DEVELOPMENT
WINCHESTER & BRIGGS ROAD
MURRIETA, CA 92563

S:\Projects\2019\19005_Marks_JIB_French Valley CA\Hydrology\19005_H&H Exhibit_Existing Drainage Map.dwg

H.M.L.

HYDROLOGY CALCULATION SUMMARY

(Using Riverside County Hydrology Manual and AES)

PROJECT: JIB French Valley
LOCATION: Riverside Co. (Unincorporated)
DATE: 10/22/20

Slope Intensity-Duration Curve	0.56
2-Year, 1-Hour Precipitation	0.50 in
100-Year, 1-Hour Precipitation	1.20 in
Hydrologic Soil Group	C

EXISTING CONDITION:

AES Data Input: ***AES Output/Results:***

Drainage Area			AES Nodes			Action	Elevation		Flow	Slope	A_{IMP}	AES Land Use	2-yr Storm		10-yr Storm		100-yr Storm	
ID	SF	AC					Up	Down	Length (ft)	(ft/ft)	%	(see table below)	Q_{sub} (cfs)	Q_{peak} (cfs)	Q_{sub} (cfs)	Q_{peak} (cfs)	Q_{sub} (cfs)	Q_{peak} (cfs)
A	94,330	2.17	1.01	→	1.02	Initial Sub-Area	346.73	342.80	722	0.005	0%	Undeveloped	1.05	1.05	1.97	1.97	3.30	3.30
TOTAL	94,330	2.17												1.05		1.97		3.30

A_{IMP}	AES Land Use Classification
90%	Commercial
80%	Apartment
75%	Mobile Home Park
65%	Condominium
50%	Single Family (1/4 ac)
40%	Single Family (1/2 ac)
20%	Single Family (1 ac)
0%	Undeveloped

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1631

                         Analysis prepared by:

                   COMMERCIAL DEVELOPMENT RESOURCES
                    4121 Westerly Place, Suite 112
                        Newport Beach, CA 92660


 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for JIB FRENCH VALLEY                                 *
* In the County of Riverside                                            *
* Existing Condition: 2-year Storm Event                                *
 ************************************************************************


--------------------------------------------------------------------------
  FILE NAME: 19005EX.DAT
  TIME/DATE OF STUDY: 15:39 06/25/2020
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  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =    2.00   1-HOUR INTENSITY(INCH/HOUR) =   0.500
  SLOPE OF INTENSITY DURATION CURVE = 0.5600
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
```

```
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   722.00
  UPSTREAM ELEVATION(FEET) =    346.73
  DOWNSTREAM ELEVATION(FEET) =    342.80
  ELEVATION DIFFERENCE(FEET) =      3.93
  TC = 0.533*[(  722.00**3)/(     3.93)]**.2 =   21.021
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.900
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5403
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.05
  TOTAL AREA(ACRES) =      2.17   TOTAL RUNOFF(CFS) =      1.05
============================================================================
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  TOTAL AREA(ACRES)     =        2.2  TC(MIN.) =     21.02
  PEAK FLOW RATE(CFS)   =       1.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1631

                         Analysis prepared by:

                   COMMERCIAL DEVELOPMENT RESOURCES
                    4121 Westerly Place, Suite 112
                        Newport Beach, CA 92660


 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for JIB FRENCH VALLEY                                 *
* In the County of Riverside                                            *
* Existing Condition: 10-year Storm Event                               *
 **************************************************************************


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  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
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  SLOPE OF INTENSITY DURATION CURVE = 0.5600
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  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
```

```
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   722.00
  UPSTREAM ELEVATION(FEET) =    346.73
  DOWNSTREAM ELEVATION(FEET) =    342.80
  ELEVATION DIFFERENCE(FEET) =      3.93
  TC = 0.533*[(  722.00**3)/(     3.93)]**.2 =   21.021
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.432
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6345
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      2.17   TOTAL RUNOFF(CFS) =      1.97
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.2  TC(MIN.) =     21.02
  PEAK FLOW RATE(CFS)   =       1.97
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
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                Release Date: 07/01/2016  License ID 1631

                         Analysis prepared by:

                   COMMERCIAL DEVELOPMENT RESOURCES
                    4121 Westerly Place, Suite 112
                        Newport Beach, CA 92660


 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for JIB FRENCH VALLEY                                 *
* In the County of Riverside                                            *
* Existing Condition: 100-year Storm Event                              *
 **************************************************************************


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  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5600
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
```

```
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   722.00
  UPSTREAM ELEVATION(FEET) =    346.73
  DOWNSTREAM ELEVATION(FEET) =    342.80
  ELEVATION DIFFERENCE(FEET) =      3.93
  TC = 0.533*[(  722.00**3)/(     3.93)]**.2 =   21.021
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.159
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7045
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.30
  TOTAL AREA(ACRES) =      2.17   TOTAL RUNOFF(CFS) =      3.30
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.2  TC(MIN.) =     21.02
  PEAK FLOW RATE(CFS)   =       3.30
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

ATTACHMENT 3

Proposed Drainage Map & Runoff Calculations

WINCHESTER ROAD

STATE HIGHWAY 79

EXISTING 18" RCP SD LINE

EXISTING SD INLET

EX 4' DIA DROP INLET

DETENTION VAULT

NODE 1.13
346.35 EL

NODE 1.01
346.62 EL

NODE 1.02
344.55 EL
341.91 INV
ΣQ_2=0.56cfs
ΣQ_{10}=0.90cfs
ΣQ_{100}=1.38cfs

NODE 1.03
341.32 INV
ΣQ_2=0.56cfs
ΣQ_{10}=0.90cfs
ΣQ_{100}=1.38cfs

NODE 1.04
340.28 INV
ΣQ_2=0.95cfs
ΣQ_{10}=1.54cfs
ΣQ_{100}=2.36cfs

NODE 1.05
340.21 INV
ΣQ_2=1.22cfs
ΣQ_{10}=1.99cfs
ΣQ_{100}=3.05cfs

NODE 1.06
339.57 INV

NODE 1.07
347.80 EL

NODE 1.08
344.17 EL
342.67 INV
Q_2=0.54cfs
Q_{10}=0.88cfs
Q_{100}=1.34cfs

NODE 1.09
342.59 INV

NODE 1.10
340.09 INV
ΣQ_2=1.21cfs
ΣQ_{10}=1.97cfs
ΣQ_{100}=3.01cfs

NODE 1.11
339.57 INV
ΣQ_2=2.24cfs
ΣQ_{10}=3.37cfs
ΣQ_{100}=5.65cfs

NODE 1.12
339.32 INV
ΣQ_2=2.24cfs
ΣQ_{10}=3.37cfs
ΣQ_{100}=5.65cfs

NODE 1.14
(342.80 EL)
(339.22 INV)
ΣQ_2=2.44cfs
ΣQ_{10}=4.06cfs
ΣQ_{100}=6.32cfs

A1 0.34 | A2 0.02 | A3 0.15 | A4 0.13 | A5 0.20 | A6 0.33 | A7 0.08 | A8 0.21 | A9 0.14 | A10 0.57

PROPOSED BUILDING

PROPOSED BUILDING

BRIGGS ROAD

BRIGGS ROAD

EXISTING SD INLET

EXISTING SD INLET

EXISTING SD INLET

0 60 120

GRAPHIC SCALE
SCALE: 1"= 60'

LEGEND:

- BIOFILTRATION BASIN
- CONCRETE
- LANDSCAPE
- MAJOR DRAINAGE AREA (DA) BOUNDARY
- MINOR DRAINAGE AREA (DA) BOUNDARY
- PROPERTY LINE
- CENTERLINE
- # / # DRAINAGE AREA ID SIZE (ACRES)
- STORM DRAIN LINE
- FLOWPATH

PREPARED FOR:

DMSD PROPERTY, LLC
41760 IVY STREET, SUITE 201
MURRIETA, CA 92562
TEL: (951) 816-0189

PREPARED BY:

Commercial Development Resources
Today's Ideas Tomorrow's Reality

4121 WESTERLY PLACE, #112
NEWPORT BEACH, CA 92660
CONTACT: AARON ALBERTSON, PE
TEL: (949) 610-8997

HYDROLOGY EXHIBIT: PROPOSED DRAINAGE MAP

FRENCH VALLEY DEVELOPMENT
WINCHESTER & BRIGGS ROAD
MURRIETA, CA 92563

H.M.L.

S:\Projects\2019\19005_Marks_JIB_French Valley CA\Hydrology\19005_H&H Exhibit_Proposed Drainage Map.dwg

HYDROLOGY CALCULATION SUMMARY

(Using Riverside County Hydrology Manual and AES)

PROJECT: JIB French Valley
LOCATION: Riverside Co. (Unincorporated)
DATE: 02/17/2021

Slope Intensity-Duration Curve	0.56
2-Year, 1-Hour Precipitation	0.50 in
100-Year, 1-Hour Precipitation	1.20 in
Hydrologic Soil Group	C

PROPOSED CONDITION:

AES Data Input: ***AES Output/Results:***

Drainage Area			AES Nodes			Action	Elevation		Flow	Slope	A_{IMP}	AES Land Use	2-yr Storm		10-yr Storm		100-yr Storm	
ID	SF	AC					Up	Down	Length (ft)	(ft/ft)	%	(see table below)	Q_{sub} (cfs)	Q_{peak} (cfs)	Q_{sub} (cfs)	Q_{peak} (cfs)	Q_{sub} (cfs)	Q_{peak} (cfs)
A1	14,668	0.337	1.01	→	1.02	initial subarea	346.62	344.55	162	0.013	81%	Apartment	0.53	---	0.85	---	1.30	---
A2	833	0.019	1.02	→	1.02	add subarea	---	---	---	---	100%	Commercial	0.03	(0.56)	0.05	(0.90)	0.07	(1.38)
---	---	---	1.02	→	1.03	pipe flow	341.91	341.32	30	0.020	---	---	---	(0.56)	---	(0.90)	---	(1.38)
---	---	---	1.03	→	1.04	pipe flow	341.32	340.28	208	0.005	---	---	---	(0.56)	---	(0.90)	---	(1.38)
A3	6,412	0.147	1.04	→	1.04	add subarea	---	---	---	---	87%	Commercial	0.21	---	0.34	---	0.52	---
A4	5,766	0.132	1.04	→	1.04	add subarea	---	---	---	---	69%	Mobile Home	0.18	(0.95)	0.30	(1.54)	0.46	(2.36)
---	---	---	1.04	→	1.05	pipe flow	340.28	340.21	8	0.008	---	---	---	(0.95)	---	(1.54)	---	(2.36)
A5	8,608	0.198	1.05	→	1.05	add subarea	---	---	---	---	81%	Apartment	0.27	(1.22)	0.45	(1.99)	0.69	(3.05)
---	---	---	1.05	→	1.06	pipe flow, conf 1/2	340.21	339.57	82	0.008	---	---	---	(1.22)	---	(1.99)	---	(3.05)
A6	14,540	0.334	1.07	→	1.08	initial subarea	347.80	344.17	174	0.021	81%	Apartment	0.54	(0.54)	0.88	(0.88)	1.34	(1.34)
---	---	---	1.08	→	1.09	pipe flow	342.67	342.59	13	0.006	---	---	---	(0.54)	---	(0.88)	---	(1.34)
A7	3,610	0.083	1.10	→	1.10	add subarea	---	---	---	---	100%	Commercial	0.14	---	0.22	---	0.34	---
A8	8,988	0.206	1.10	→	1.10	add subarea	---	---	---	---	61%	Condominium	0.32	---	0.53	---	0.81	---
A9	6,038	0.139	1.10	→	1.10	add subarea	---	---	---	---	27%	1/2 ac Lot	0.20	(1.21)	0.34	(1.97)	0.53	(3.01)
---	---	---	1.10	→	1.11	pipe flow, conf 2/2	340.09	339.57	25	0.021	---	---	---	2.24	---	3.67	---	5.65
A10	24,866	0.571	1.13	→	1.14	initial subarea	346.35	342.80	517	0.007	2%	Undeveloped	0.20	0.20	0.39	0.39	0.67	0.67
TOTAL	94,330	2.17												2.44		4.06		6.32
													Δ%	132%		106%		92%
													ΔQ	1.39		2.09		3.02

A_{IMP}	AES Land Use Classification
90%	Commercial
80%	Apartment
75%	Mobile Home Park
65%	Condominium
50%	Single Family (1/4 ac)
40%	Single Family (1/2 ac)
20%	Single Family (1 ac)
0%	Undeveloped

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1631

                          Analysis prepared by:

                    COMMERCIAL DEVELOPMENT RESOURCES
                     4121 Westerly Place, Suite 112
                         Newport Beach, CA 92660


 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for FRENCH VALLEY DEVELOPMENT                       *
* In the County of Riverside                                          *
* Proposed Condition: 2-year Storm Event                              *
 **********************************************************************


----------------------------------------------------------------------------
  FILE NAME: 19005PR.DAT
  TIME/DATE OF STUDY: 17:44 02/17/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =    2.00   1-HOUR INTENSITY(INCH/HOUR) =   0.500
  SLOPE OF INTENSITY DURATION CURVE = 0.5600
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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      1.01 TO NODE      1.02 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS APARTMENT
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  UPSTREAM ELEVATION(FEET) =    346.62
  DOWNSTREAM ELEVATION(FEET) =    344.55
  ELEVATION DIFFERENCE(FEET) =      2.07
  TC = 0.323*[(  162.00**3)/(     2.07)]**.2 =    5.906
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.831
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8556
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.02 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.831
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8778
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.02   SUBAREA RUNOFF(CFS) =    0.03
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       0.56
  TC(MIN.) =    5.91

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.91  DOWNSTREAM(FEET) =   341.32
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.56
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.02
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.03 =     192.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.03 TO NODE      1.04 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.32  DOWNSTREAM(FEET) =   340.28
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.012
```

```
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.73
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.56
  PIPE TRAVEL TIME(MIN.) =   1.27    Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.04 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.628
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8758
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.21
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       0.77
  TC(MIN.) =    7.29

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.628
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .8395
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       0.95
  TC(MIN.) =    7.29

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.05 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.28  DOWNSTREAM(FEET) =   340.21
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.85
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.95
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.32
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.05 =     408.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.05 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.624
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8515
  SOIL CLASSIFICATION IS "C"
```

```
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.27
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.22
  TC(MIN.) =    7.32

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.06 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.21  DOWNSTREAM(FEET) =   339.57
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.22
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    7.67
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.06 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.06 TO NODE      1.06 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.67
  RAINFALL INTENSITY(INCH/HR) =   1.58
  TOTAL STREAM AREA(ACRES) =     0.83
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.22

****************************************************************************
  FLOW PROCESS FROM NODE      1.07 TO NODE      1.08 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS APARTMENT
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   174.00
  UPSTREAM ELEVATION(FEET) =    347.80
  DOWNSTREAM ELEVATION(FEET) =    344.17
  ELEVATION DIFFERENCE(FEET) =      3.63
  TC = 0.323*[(  174.00**3)/(     3.63)]**.2 =    5.510
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.904
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8569
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE      1.08 TO NODE      1.09 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.67  DOWNSTREAM(FEET) =   342.59
  FLOW LENGTH(FEET) =    13.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.91
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.54
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.58
  LONGEST FLOWPATH FROM NODE      1.07 TO NODE      1.09 =     187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.890
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8783
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       0.68
  TC(MIN.) =    5.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.890
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8242
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.00
  TC(MIN.) =    5.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.890
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .7700
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.20
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.21
  TC(MIN.) =    5.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.09  DOWNSTREAM(FEET) =   339.57
```

```
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.21
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.66
  LONGEST FLOWPATH FROM NODE      1.07 TO NODE      1.11 =     212.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.11 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.) =    5.66
  RAINFALL INTENSITY(INCH/HR) =   1.88
  TOTAL STREAM AREA(ACRES) =     0.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.22     7.67        1.582          0.83
      2        1.21     5.66        1.876          0.76

 ********************************WARNING*************************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  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        2.11     5.66       1.876
      2        2.24     7.67       1.582

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.24   Tc(MIN.) =    7.67
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.11 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.13 TO NODE      1.14 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   517.00
  UPSTREAM ELEVATION(FEET) =    346.35
  DOWNSTREAM ELEVATION(FEET) =    342.80
  ELEVATION DIFFERENCE(FEET) =      3.55
  TC = 0.937*[(  517.00**3)/(     3.55)]**.2 =   30.901
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.725
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4928
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.57   TOTAL RUNOFF(CFS) =      0.20
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.6  TC(MIN.) =     30.90
  PEAK FLOW RATE(CFS)   =       0.20
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1631

                          Analysis prepared by:

                    COMMERCIAL DEVELOPMENT RESOURCES
                     4121 Westerly Place, Suite 112
                         Newport Beach, CA 92660


 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for FRENCH VALLEY DEVELOPMENT                         *
* In the County of Riverside                                            *
* Proposed Condition: 10-year Storm Event                               *
 ************************************************************************


------------------------------------------------------------------------
  FILE NAME: 19005PR.DAT
  TIME/DATE OF STUDY: 17:44 02/17/2021
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.796
  SLOPE OF INTENSITY DURATION CURVE = 0.5600
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
```

```
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS APARTMENT
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  UPSTREAM ELEVATION(FEET) =    346.62
  DOWNSTREAM ELEVATION(FEET) =    344.55
  ELEVATION DIFFERENCE(FEET) =      2.07
  TC = 0.323*[(  162.00**3)/(     2.07)]**.2 =    5.906
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.915
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8693
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.02 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.915
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8847
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.02   SUBAREA RUNOFF(CFS) =    0.05
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       0.90
  TC(MIN.) =    5.91

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.91  DOWNSTREAM(FEET) =   341.32
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.90
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.00
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.03 =     192.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.03 TO NODE      1.04 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.32  DOWNSTREAM(FEET) =   340.28
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.06
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.90
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.04 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.622
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8833
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.24
  TC(MIN.) =    7.14

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.622
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .8582
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.30
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.54
  TC(MIN.) =    7.14

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.05 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.28  DOWNSTREAM(FEET) =   340.21
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.20
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       1.54
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.17
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.05 =     408.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.05 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.616
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8665
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.45
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.99
  TC(MIN.) =    7.17

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.06 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.21  DOWNSTREAM(FEET) =   339.57
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.43
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.99
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    7.48
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.06 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.06 TO NODE      1.06 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.48
  RAINFALL INTENSITY(INCH/HR) =   2.55
  TOTAL STREAM AREA(ACRES) =     0.83
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE      1.07 TO NODE      1.08 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS APARTMENT
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   174.00
  UPSTREAM ELEVATION(FEET) =    347.80
  DOWNSTREAM ELEVATION(FEET) =    344.17
  ELEVATION DIFFERENCE(FEET) =      3.63
  TC = 0.323*[(  174.00**3)/(     3.63)]**.2 =    5.510
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.031
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8703
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE      1.08 TO NODE      1.09 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.67  DOWNSTREAM(FEET) =   342.59
  FLOW LENGTH(FEET) =    13.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.31
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.88
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.58
  LONGEST FLOWPATH FROM NODE      1.07 TO NODE      1.09 =     187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.011
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8851
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.22
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.10
  TC(MIN.) =    5.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.011
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8477
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.53
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.63
  TC(MIN.) =    5.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.011
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .8104
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.97
  TC(MIN.) =    5.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.09  DOWNSTREAM(FEET) =   339.57
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.97
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.64
  LONGEST FLOWPATH FROM NODE      1.07 TO NODE      1.11 =     212.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.11 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.) =    5.64
  RAINFALL INTENSITY(INCH/HR) =   2.99
  TOTAL STREAM AREA(ACRES) =     0.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.97

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.99     7.48        2.555          0.83
      2        1.97     5.64        2.991          0.76

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  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        3.47     5.64       2.991
      2        3.67     7.48       2.555

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.67   Tc(MIN.) =    7.48
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.11 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.13 TO NODE      1.14 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   517.00
  UPSTREAM ELEVATION(FEET) =    346.35
  DOWNSTREAM ELEVATION(FEET) =    342.80
  ELEVATION DIFFERENCE(FEET) =      3.55
  TC = 0.937*[(  517.00**3)/(     3.55)]**.2 =   30.901
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.154
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5925
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.57   TOTAL RUNOFF(CFS) =      0.39
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.6  TC(MIN.) =     30.90
  PEAK FLOW RATE(CFS)   =       0.39
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1631

                        Analysis prepared by:

                   COMMERCIAL DEVELOPMENT RESOURCES
                    4121 Westerly Place, Suite 112
                        Newport Beach, CA 92660


 ************************ DESCRIPTION OF STUDY ************************
* Hydrology Study for FRENCH VALLEY DEVELOPMENT                       *
* In the County of Riverside                                          *
* Proposed Condition: 100-year Storm Event                            *
 **********************************************************************


----------------------------------------------------------------------------
  FILE NAME: 19005PR.DAT
  TIME/DATE OF STUDY: 17:44 02/17/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5600
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
```

```
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.01 TO NODE      1.02 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS APARTMENT
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  UPSTREAM ELEVATION(FEET) =    346.62
  DOWNSTREAM ELEVATION(FEET) =    344.55
  ELEVATION DIFFERENCE(FEET) =      2.07
  TC = 0.323*[(  162.00**3)/(     2.07)]**.2 =    5.906
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.396
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.30
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.30

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.02 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.396
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8892
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.02   SUBAREA RUNOFF(CFS) =    0.07
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.38
  TC(MIN.) =    5.91

****************************************************************************
  FLOW PROCESS FROM NODE      1.02 TO NODE      1.03 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.91  DOWNSTREAM(FEET) =   341.32
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.72
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.38
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.03 =     192.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.03 TO NODE      1.04 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.32  DOWNSTREAM(FEET) =   340.28
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.41
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.38
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    7.01
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.04 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.993
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8883
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.90
  TC(MIN.) =    7.01

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.04 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.993
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .8707
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.46
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.36
  TC(MIN.) =    7.01

****************************************************************************
  FLOW PROCESS FROM NODE      1.04 TO NODE      1.05 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.28  DOWNSTREAM(FEET) =   340.21
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       2.36
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.04
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.05 =     408.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.05 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.984
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8765
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.69
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       3.05
  TC(MIN.) =    7.04

****************************************************************************
  FLOW PROCESS FROM NODE      1.05 TO NODE      1.06 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.21  DOWNSTREAM(FEET) =   339.57
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.05
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    7.32
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.06 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.06 TO NODE      1.06 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.32
  RAINFALL INTENSITY(INCH/HR) =   3.90
  TOTAL STREAM AREA(ACRES) =     0.83
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.05

****************************************************************************
  FLOW PROCESS FROM NODE      1.07 TO NODE      1.08 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS APARTMENT
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   174.00
  UPSTREAM ELEVATION(FEET) =    347.80
  DOWNSTREAM ELEVATION(FEET) =    344.17
  ELEVATION DIFFERENCE(FEET) =      3.63
  TC = 0.323*[(  174.00**3)/(     3.63)]**.2 =    5.510
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.570
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8791
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.34
  TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      1.34

****************************************************************************
  FLOW PROCESS FROM NODE      1.08 TO NODE      1.09 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.67  DOWNSTREAM(FEET) =   342.59
  FLOW LENGTH(FEET) =    13.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.55
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.34
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.57
  LONGEST FLOWPATH FROM NODE      1.07 TO NODE      1.09 =     187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.542
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8895
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.68
  TC(MIN.) =    5.57

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.542
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8633
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.81
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.48
  TC(MIN.) =    5.57
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.542
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .8371
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.53
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       3.01
  TC(MIN.) =    5.57

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.09  DOWNSTREAM(FEET) =   339.57
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.01
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.63
  LONGEST FLOWPATH FROM NODE      1.07 TO NODE      1.11 =     212.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.11 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.) =    5.63
  RAINFALL INTENSITY(INCH/HR) =   4.52
  TOTAL STREAM AREA(ACRES) =     0.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.01

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.05     7.32        3.897          0.83
      2        3.01     5.63        4.515          0.76

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ****************************************************************************

  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        5.36     5.63       4.515
      2        5.65     7.32       3.897

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.65   Tc(MIN.) =    7.32
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE      1.01 TO NODE      1.11 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.13 TO NODE      1.14 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   517.00
  UPSTREAM ELEVATION(FEET) =    346.35
  DOWNSTREAM ELEVATION(FEET) =    342.80
  ELEVATION DIFFERENCE(FEET) =      3.55
  TC = 0.937*[(  517.00**3)/(     3.55)]**.2 =   30.901
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.740
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6695
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.57   TOTAL RUNOFF(CFS) =      0.67
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.6  TC(MIN.) =     30.90
  PEAK FLOW RATE(CFS)   =       0.67
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

ATTACHMENT 4

Hydromodification Flow Control Calculations

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	TBD	Rain Gauge	Eastern Slopes
Latitude (decimal format):	33.589739	BMP Type (per WQMP):	Detention Vault (StormTank)
Longitude (decimal format):	-117.12657	BMP Number (Sequential):	BMP No. 5

Pre-Development - Hydrology Information

DRAINAGE AREA (ACRES) - 10 acre max[1]	1.595	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.5
LONGEST WATERCOURSE (FT) - 1,000' max[1]	722	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	346.73	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	342.8	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Poor Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	1.595 Ac.	Chaparral, Narrowleaf	Poor Cover	0	0	100	0	75	**88**	95
								0	**0**	0
								0	**0**	0
	1.60 Ac.						**Weighted Average RI Numbers =**	**75.0**	**88.0**	**95.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	Calculated Lower Flow-rate limit
Ex. 10-year Flowrate[1] = **1.133** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.108** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

DRAINAGE AREA (ACRES)	1.595
LONGEST WATERCOURSE (FT)	179
DIFFERENCE IN ELEV (FT) - along watercourse	2
PROPOSED IMPERVIOUS PERCENTAGE (%)	0.747

Go to "BMP Design" tab to design your BMP, then check results below.
Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	1.595 Ac.	Urban Landscaping	Good Cover	0	0	100	0	50	**69**	84
								0	**0**	0
								0	**0**	0
	1.60 Ac.						**Weighted Average RI Numbers =**	**50.0**	**69.0**	**84.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
		Requirement		Proposed			
Hydromod Ponded depth	**2.00 feet**						
Hydromod Drain Time (unclogged)	**9.28 hours**						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: Aaron Albertson, P.E. Date: 2/17/2021

Signature:

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

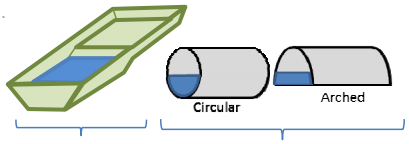
BMP Geometry & Detention Calculations

0.08 feet, Stage Intervals — Larger intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? **2** 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= **2.0'** SS= **0** :1

	Top Area	Bottom Area	
Width	4.5	4.5	FT
Length	201.973	202	FT
area =	908.8785	area = 908.9	

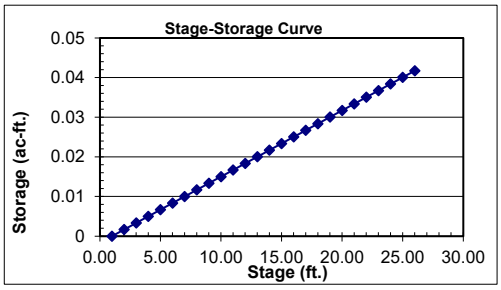
Top Stage H= **0.0'**

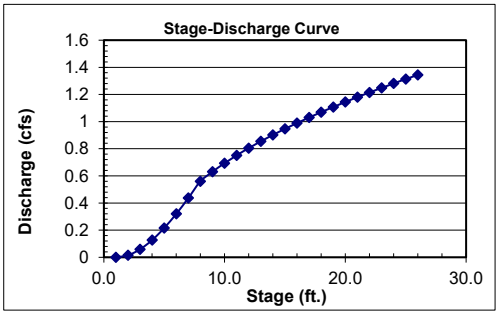
Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	1,818	FT3
Total Prop. Volume[1] =	1,818	FT3
Max HydroMod Volume =	1,795	FT3
Total Acreage[2] =	909	FT2
BMP % of Site =	1.31%	
Max HydroMod Depth[3] =	2.00	FT

[1]Does not include forebay, or low flow trench

[2]Does not account for freeboard or access roads

[3]Does not consider Increased Runoff





MINIMUM DESIGN GEOMETRY

STEP3: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0	6.13	1	2.00	2	1

Hydromod Depth = 2.00 FT

+ 1' Freeboard = 3.00 FT

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	4.5	FT
Length	201.973	FT

Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.08	0.002	73	0.02
0.16	0.003	145	0.06
0.24	0.005	218	0.13
0.32	0.007	291	0.22
0.40	0.008	364	0.32
0.48	0.010	436	0.44
0.56	0.012	509	0.56
0.64	0.013	582	0.63
0.72	0.015	654	0.69
0.80	0.017	727	0.75
0.88	0.018	800	0.80
0.96	0.020	873	0.85
1.04	0.022	945	0.90
1.12	0.023	1018	0.95
1.20	0.025	1091	0.99
1.28	0.027	1163	1.03
1.36	0.028	1236	1.07
1.44	0.030	1309	1.11
1.52	0.032	1381	1.14
1.60	0.033	1454	1.18
1.68	0.035	1527	1.22
1.76	0.037	1600	1.25
1.84	0.038	1672	1.28
1.92	0.040	1745	1.31
2.00	0.042	1818	1.34
	0.042	1,818	

STEP4: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan. Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests

Yes	Consider Infiltration (Yes or No)?		
0.15	Infiltration rate (in/hr) [3]	0.0032	ft3/sec, Infiltration (over entire bottom)
3	Factor of Safety (3 or greater) [3]	0.0011	ft3/sec, Infiltration / Factor of Safety
300	mins, Max. Time represented by tests		

[3]Per the RC LID Manual, Appendix A.

Only if allowed by the Co-Permittee, these infiltration inputs can be used to simulate Bioretention/Biofiltration rates with Backup Calcs and Data.

STORMTANK® Module Volume Calculator

Inputs

Project Name:	JIB French Valley		
Engineer:	CDR	Date:	2/11/2021
Units:	US	Shape:	Square/Rectangle
Liner:	Yes	Location:	N/A
Stacking:	Single	Height:	24
Stone Storage:	None	Porosity:	40%

Dimensions

Module		
Length:	210	ft
Width:	4.5	ft
Excavation		
Length:	212	ft
Width:	6.5	ft
Stone		
Leveling Bed:	0.5	ft
Top Backfill:	1	ft
Compacted Fill:	1	ft

Results

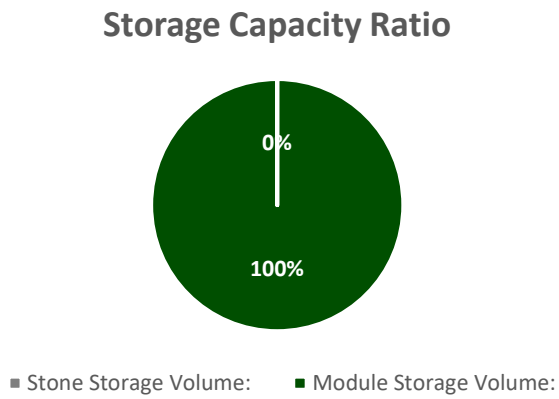
Capacity:

Stone Storage Volume:	0.00	ft^3
Module Storage Volume:	1,817.76	ft^3
Total Storage Volume:	1,817.76	ft^3

Quantities:

Required Excavation:	229.67	y^3
Required Stone Volume:	108.63	y^3
Estimated Geotextile:	868.33	y^2
Estimated Liner:	0.00	ft^2

(Estimations include 10% for scrap and overlap)

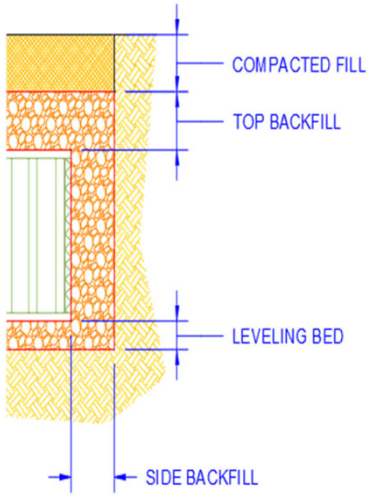


Basin Detail

Component Quantities:

	Bottom Layer	Top Layer	Total
Height	24.0	N/A	24.0
# of Modules	210	N/A	210
# of Platens	420	N/A	420
# of Side Panels	286	N/A	286
# of Columns	1,680	N/A	1,680
# of Stacking Pins	0	N/A	0

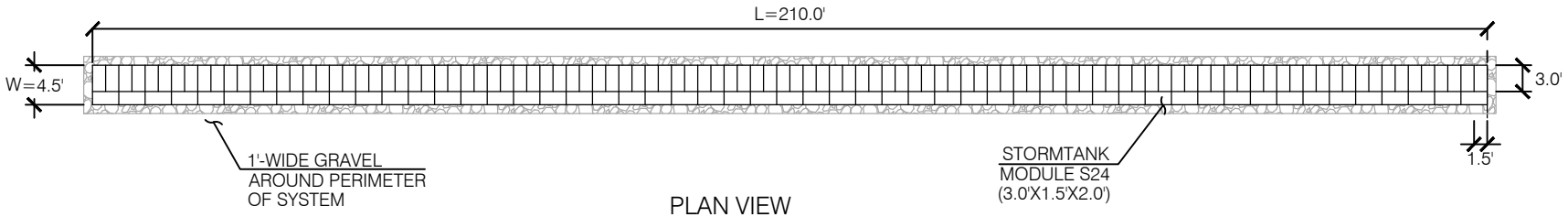
Cross-Section:



Module Footprint sf	Module Count	Module Perimeter ft	Side Panel Count	Module Height in	Module Capacity	Total Module Storage ft^3	Total Module Volume ft^3
945	210	429	286	24	8.656	1817.76	1890

Stone Footprint sf	Stone Perimeter ft	Stone Height ft	Stone Porosity	Stone Volume (All) ft^3	Stone Volume (Minus Top) ft^3	Stone Volume (None) ft^3	Stone Minus Module ft^3	Total Stone Storage ft^3
1378	437	3.50	40%	4823.000	3445.000	0.000	0.000	0.000

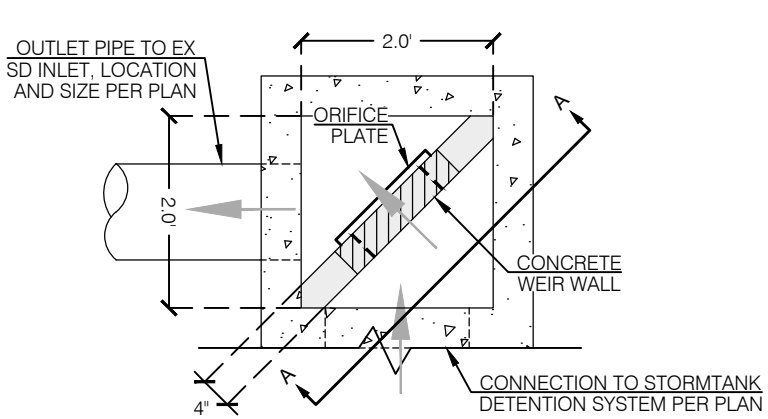
Excavation Footprint sf	Excavation Height ft	Excavation Volume ft^3	Module Geotextile sf	Excavation Geotextile sf	Module Liner sf	Excavation Liner sf	Backfill Estimation
1378	4.50	6201.000	3053.333333	4761.666667	0	0	2933

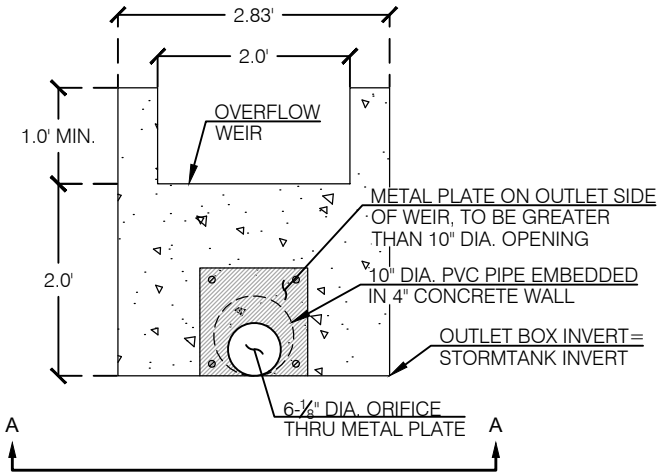


PLAN VIEW

BMP-5: DETENTION SYSTEM

(N.T.S.)





OUTLET STRUCTURE WEIR DETAIL

(N.T.S.)

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HYDROMOD. DETAILS

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ATTACHMENT 5

Storm Drain System Calculations

(This will be included in the Final Hydrology Study.)