



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

**TEMESCAL VALLEY COMMERCE CENTER
SOUTHEAST CORNER OF TEMESCAL CANYON ROAD AND
DAWSON CANYON ROAD
COUNTY OF RIVERSIDE, CA**

PREPARED FOR

DAWSON CANYON LLC
11777 SAN VICENTE BOULEVARD, SUITE 780
LOS ANGELES, CA 90049
PHONE: (949) 296-7006

NOVEMBER 2, 2020
REVISED JANUARY 07, 2021

JOB NO. 3881

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173

**PRELIMINARY HYDROLOGY
CALCULATIONS**

FOR

TEMESCAL VALLEY COMMERCE CENTER

PREPARED UNDER
THE SUPERVISION OF

REINHARD STENZEL
R.C.E. 56155
EXP. 12/31/2022

DATE:

INTRODUCTION

A: PROJECT LOCATION

The project site is located south of Park Canyon Road and east of Temescal Canyon Road in the County of Riverside, California. Please see following page for vicinity map.

B: STUDY PURPOSE

The purpose of this study is to determine the existing condition and proposed condition 100-year peak flow rates from the project site that drains to the Temescal Wash.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Tony Nuñez



Last Update: 11/1/20
O:\3900 - 3999\3905\3905Vicinity_Map.dwg



TEI Thienes Engineering, Inc.
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VICINITY MAP
FOR
TEMESCAL VALLEY COMMERCE CENTER

DISCUSSION

Project Description

The project site encompasses approximately 34.85 acres. Proposed improvements include an 183,456 square foot building and vehicle parking located adjacent to all sides of the building. A truck dock and trailer parking will be on the south side of the building. The east and west portions of the building will be loading areas. Landscape will be throughout the site and along the perimeter.

Existing Condition

The project site is currently unpaved and barren, consisting largely of compacted soil. It appears to have been part of a larger development that was partially paved, included several buildings, and was used for miscellaneous storage. The site generally surface drains to the north and discharges into the Temescal Wash. The existing condition 100-year peak flow rate from the project site is approximately 43.2 cfs (34.9 cfs from nodes 100 to 102 + 8.3 cfs from nodes 110 to 111).

See Appendix “B” for existing condition hydrology calculations and Appendix “C” for existing condition hydrology map.

Offsite Runon

Stormwater is currently draining onto the site from the neighboring properties and bordering hillsides to the southeast. The total existing condition 100-year peak flow rate that surface drains onto the site is approximately 32.3 cfs (15.4 cfs from nodes 120-121 + 9.0 cfs from nodes 130-131 + 5.0 cfs from nodes 140-141 + 2.9 cfs from nodes 150-151). Proposed improvements by others include the extension of Temescal Canyon Road along the southerly property line and a channel adjacent to the easterly property line. These site adjoining improvements will intercept and convey offsite runon away from the site.

Proposed Condition

Runoff from the northeasterly drive aisle and auto parking areas will surface drain to catch basins located in northeasterly parking lot (nodes 100-102). An onsite storm drain system, Line “B”, will convey stormwater northwest toward the easterly loading area.

Drainage from the southerly drive aisle entrance and auto parking areas along the southeast property line will surface drain northeasterly to a catch basin in the easterly parking lot (nodes 110-111). An onsite storm drain system, Line “A”, will convey runoff to the northwest, collect runoff from the abutting drive aisle (node 112), and continue toward the easterly loading area.

Stormwater from the easterly auto parking and loading area will collect in catch basins east of the proposed building (nodes 120-125). Line “A” will convey stormwater to the

north, confluence with Line “B” (node 124), turn west around the building, and continue toward the southeast portion of the Temescal Canyon Road and Dawson Canyon Road intersection.

The westerly and southwesterly vehicle parking, southerly truck yard, and westerly loading area will surface drain to catch basins located in the parking lot, truck yard, and westerly loading area (nodes 130-142). The southerly storm drain system, Line “C” will convey runoff to the north and confluence with Line “A” (node 143).

Runoff north of the building will surface drain to catch basins in the northerly auto parking and laterals will convey the stormwater to Line “A” (nodes 126-129, 144). Line “A” will ultimately discharge into a proposed storm drain system in Temescal Canyon Road. The proposed condition 100-year peak flow rate from the site is approximately 88.1 cfs.

The street adjacent landscaping and a portion of the driveways will surface drain into the adjoining streets. The proposed condition 100-year peak flow rates from the site are approximately 3.5 cfs to Park Canyon Road and 1.3 cfs to Dawson Canyon Road.

See Appendix “B” for proposed condition hydrology calculations, Appendix “C” for proposed condition hydrology map.

Conclusion

The existing and proposed condition 100-year site discharges are approximately 34.85 cfs and 92.9 cfs, respectively. The proposed improvements result in a 167 percent increase in stormwater runoff due to the decreased time of concentration and the change in development type. The increase in site runoff does not exceed the capacity of the downstream facilities. The development of the project site will not have an adverse effect on the Temescal Wash. See Table 1 for a summary of existing and proposed site runoff and runoff.

Table 1: Existing and proposed runoff and runoff summary

Existing Condition			Proposed Condition			Offsite Runon		
Nodes	Area (ft ²)	Q ₁₀₀ (cfs)	Nodes	Area (ft ²)	Q ₁₀₀ (cfs)	Nodes	Area (ft ²)	Q ₁₀₀ (cfs)
100-102	29.35	34.9	100-144	33.55	88.1	120-121	10.00	15.4
110-111	5.50	8.3	150-151	0.95	3.5	130-131	5.85	9.0
Total	34.85	43.2	160-161	0.35	1.3	140-141	5.80	5.0
			Total	34.85	92.9	150-151	1.60	2.9
						Total	23.25	32.3

Water Quality

Underground infiltration systems will be proposed to retain the runoff produced by the 85th percentile storm rainfall depth. Additional storage in the underground chambers will be provided to mitigate the hydrologic conditions of concern (HCOC). To meet HCOC requirements, the mitigation volume must be achieved by using LID and hydromodification mitigation BMPs. The mitigation volume required is approximately 170,065 cu-ft ($[205,380 \text{ cu-ft} \times 0.95] - 25,046 \text{ cu-ft}$). In addition to the 87,900 cu-ft already being provided to meet LID requirements, the underground chambers will also store an additional 82,165 cu-ft. As a result, HCOCs will be addressed by the proposed underground chambers. Since the mitigation volume has been met, it is physically impossible for the project to avoid increasing the time of concentration and reducing peak runoff by more than five percent of pre-development conditions.

Methodology

Hydrology calculations were computed using Riverside County ration method program (by AES software). The site consists of soil groups "A" and "B" per the Riverside County Hydrology Manual. Areas with more than one soil type were conservatively modeled using the designation with the higher runoff potential. Storm drain hydraulics were not analyzed for the preliminary plans. Pipe sizes and locations may change with precise plans.

See Appendix "A" for referenced materials.

APPENDIX

DESCRIPTION

A

REFERENCE MATERIAL

B

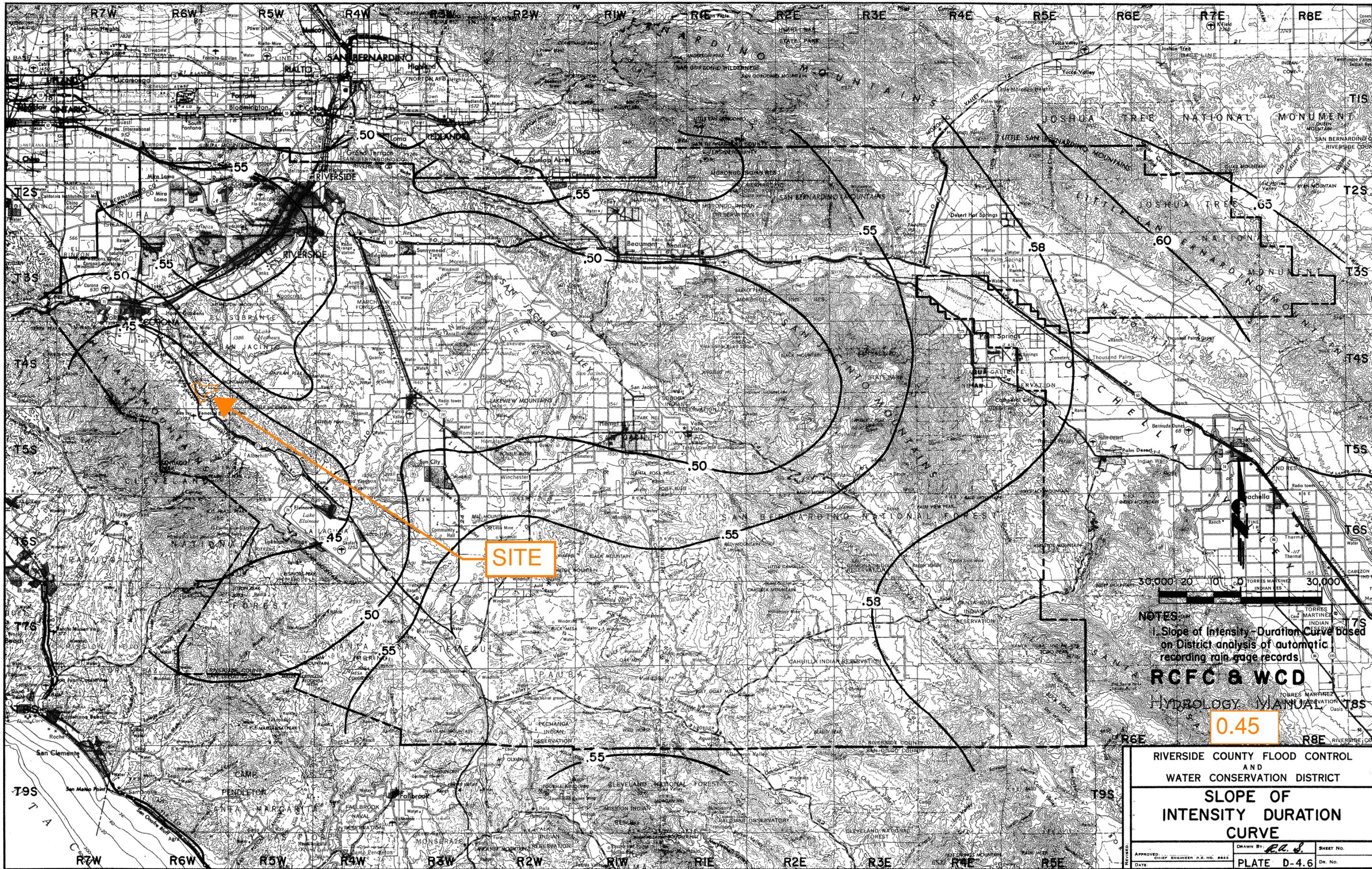
HYDROLOGY CALCULATIONS

C

HYDROLOGY MAPS

APPENDIX A

REFERENCE MATERIAL



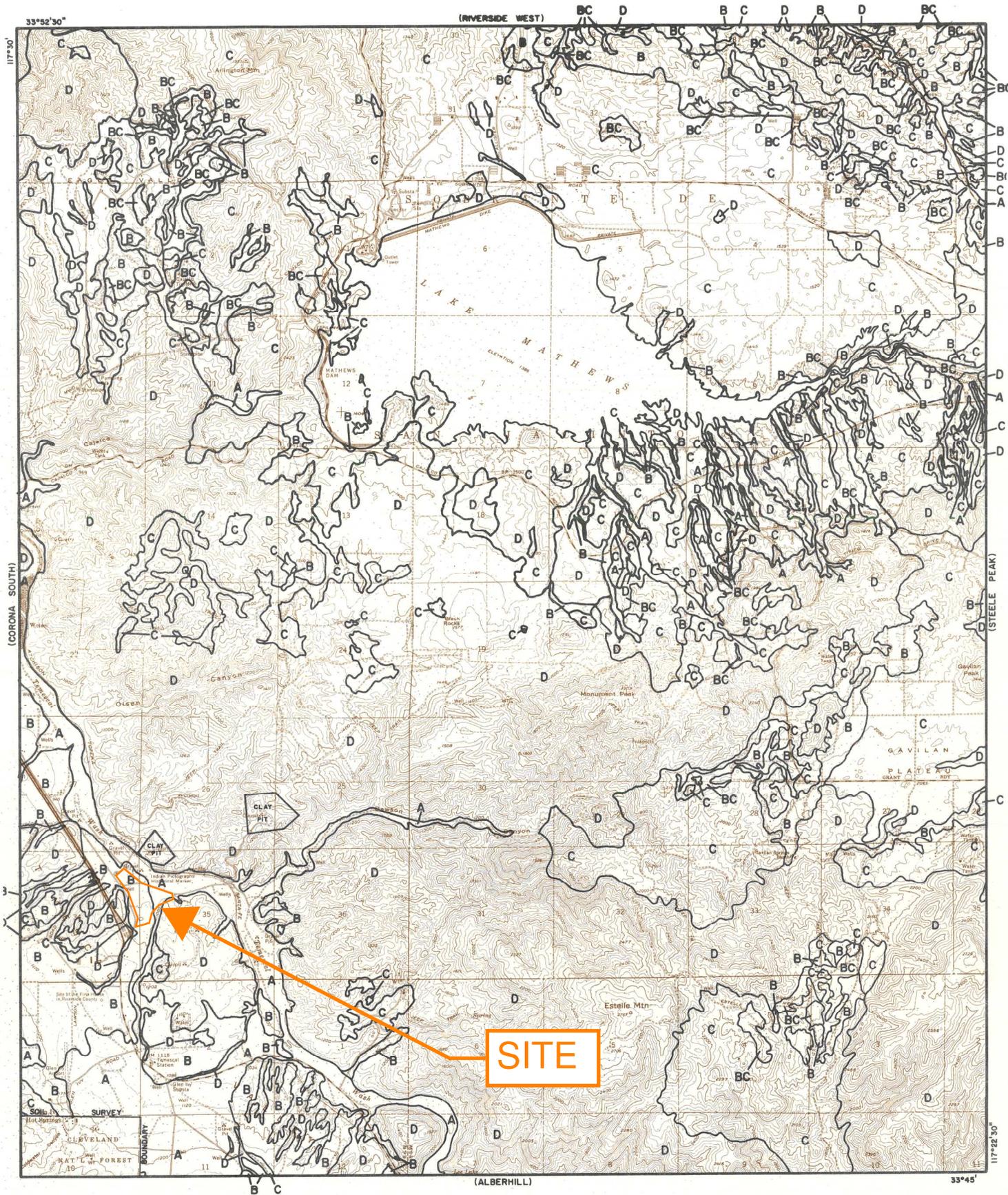
SITE

NOTES:
 1. Slope of Intensity-Duration Curve Based on District analysis of automatic recording rain-gage records.

RCFC & WCD
 HYDROLOGY MANUAL

0.45

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
SLOPE OF INTENSITY DURATION CURVE		
APPROVED:	DRAWN BY:	SHEET NO.
DATE:	CHIEF ENGINEER P.E. NO. 8822	PLATE D-4.6
		Dr. No.



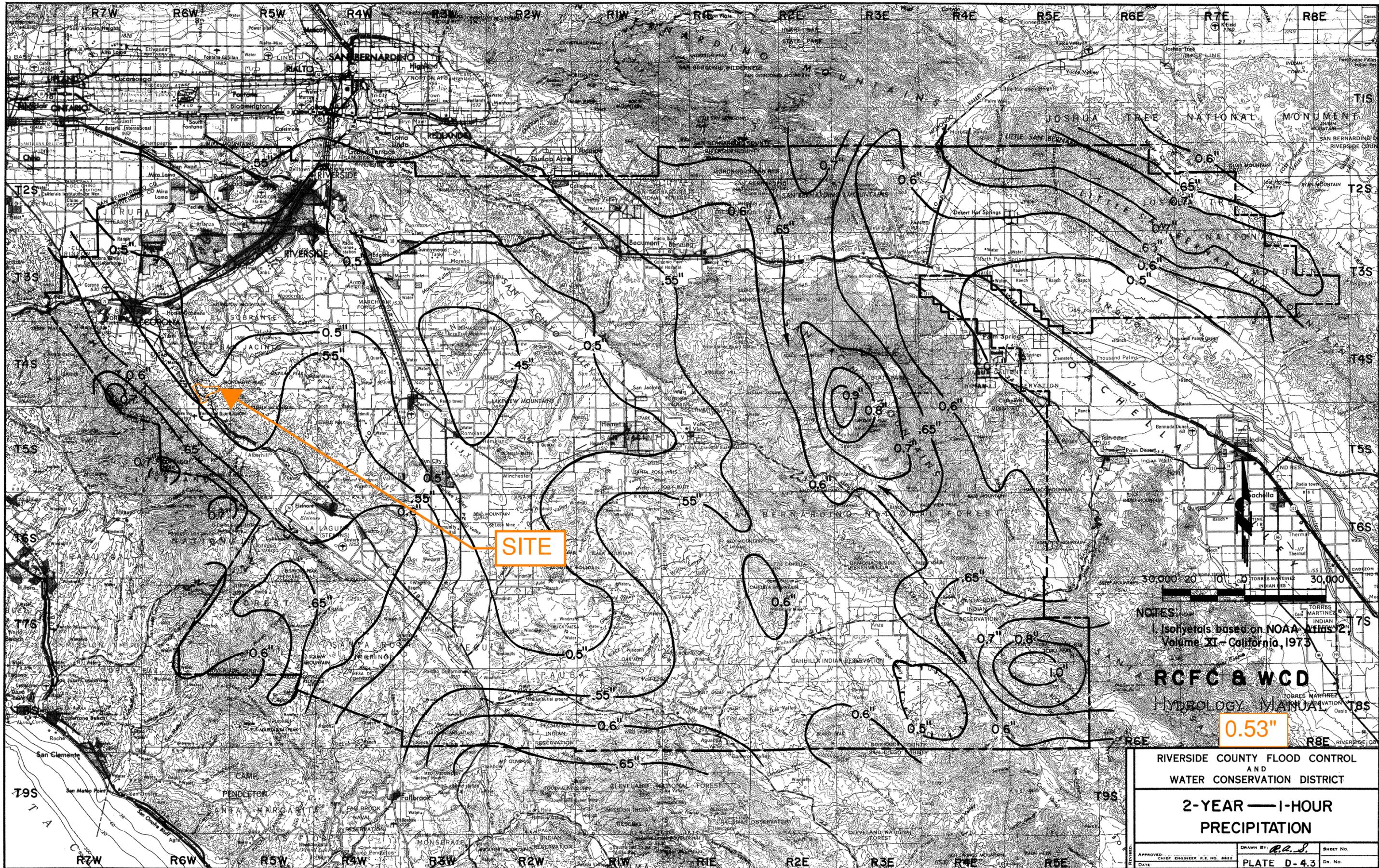
LEGEND

— SOILS GROUP BOUNDARY
 A SOILS GROUP DESIGNATION

RCFC & WCD
 HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP
FOR
LAKE MATHEWS

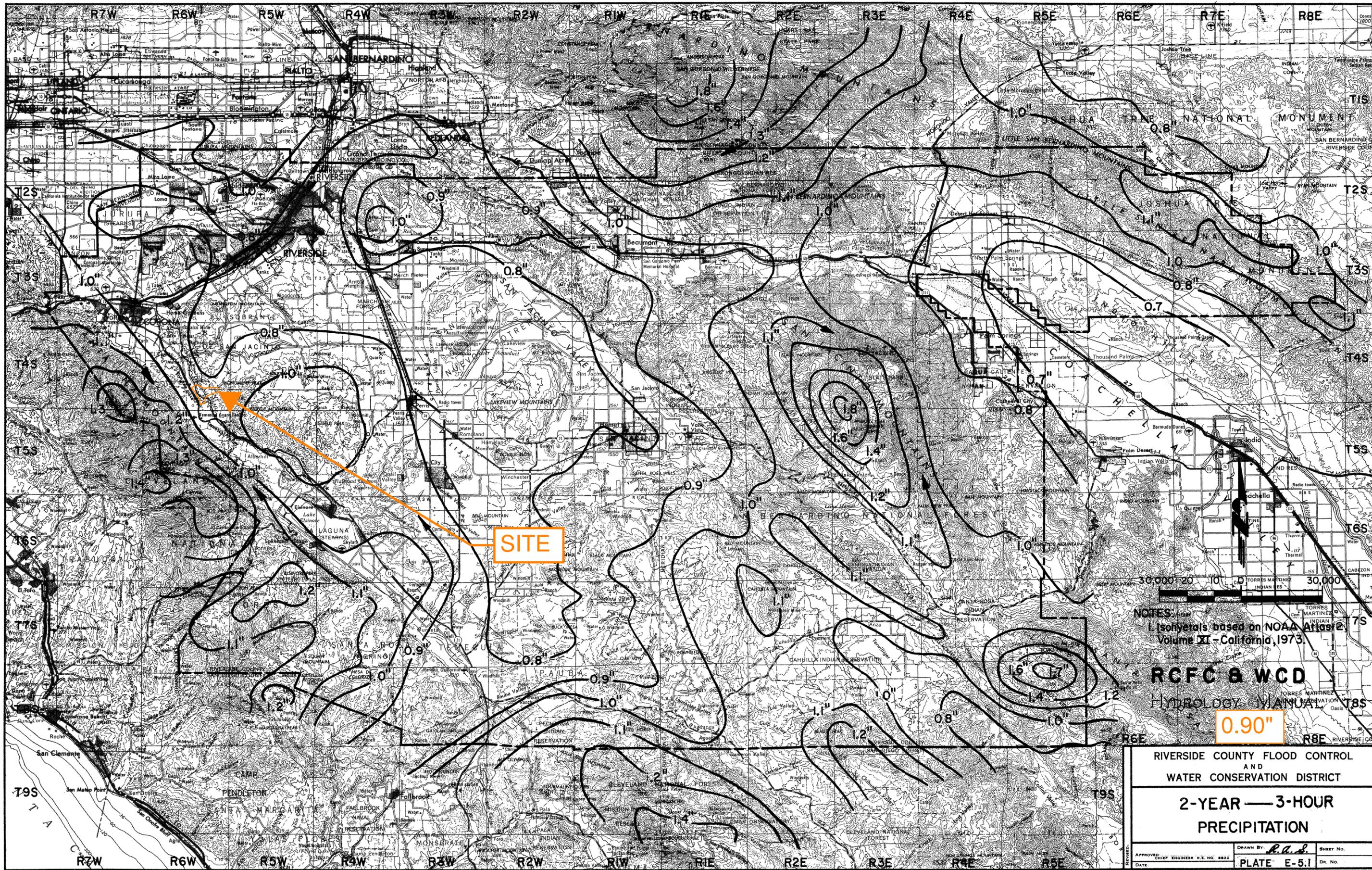


NOTES:
 Isohyets based on NOAA Atlas 2,
 Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL

0.53"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 1-HOUR PRECIPITATION		
APPROVED	DRAWN BY	SHEET NO.
DATE	CHIEF ENGINEER R.E. NO. 8832	DR. NO.
PLATE D-43		

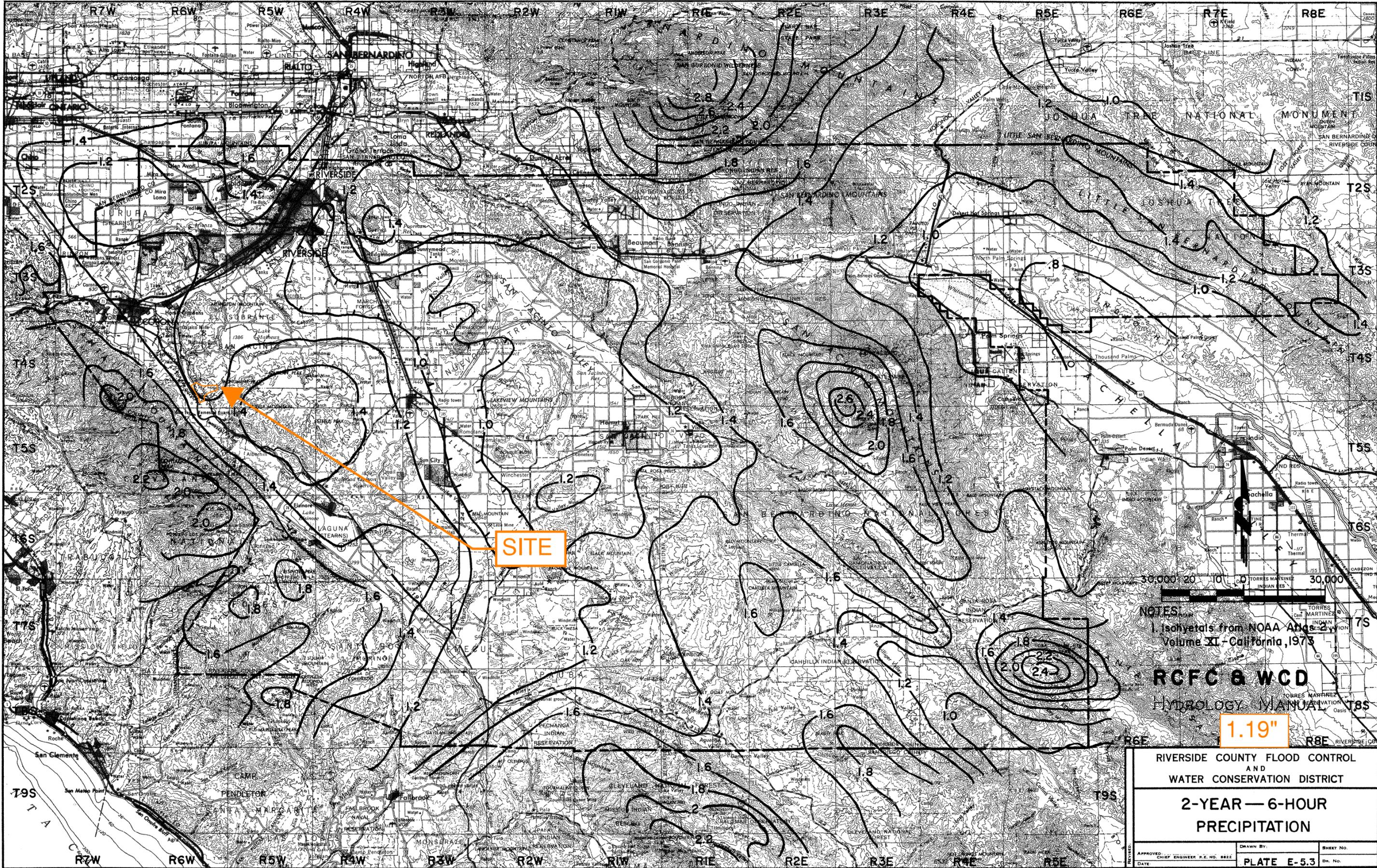


NOTES:
 1. Isohyets based on NOAA Atlas 2,
 Volume XI - California, 1973.

RCFC & WCD
 HYDROLOGY MANUAL

0.90"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 3-HOUR PRECIPITATION		
APPROVED: _____ CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: <i>R.A.S.</i>	SHEET NO. _____
DATE: _____	PLATE E-5.1	DR. NO. _____



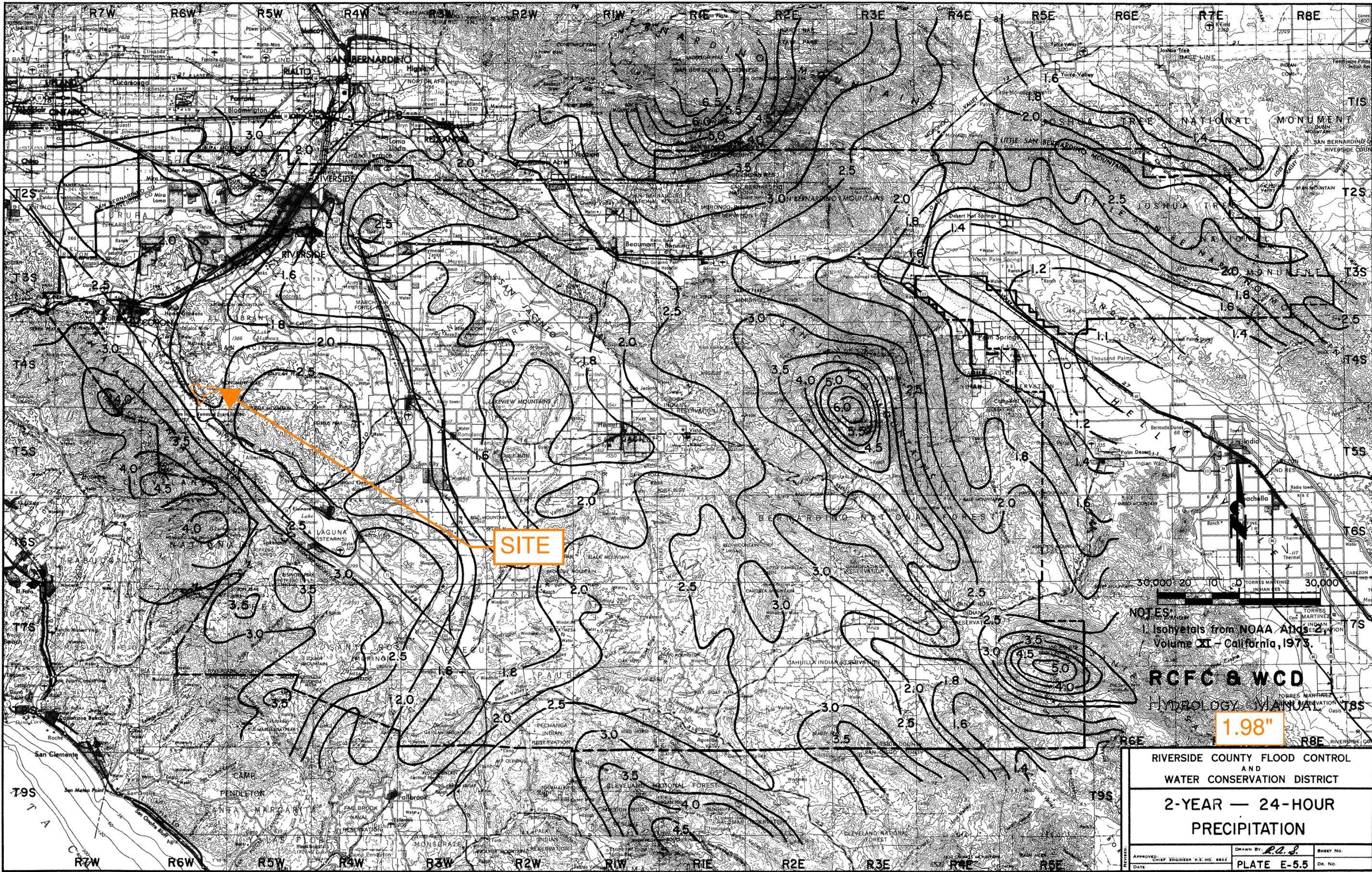
SITE

NOTES:
 1. Isohyets from NOAA Atlas 2, Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL

1.19"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 6-HOUR PRECIPITATION		
APPROVED:	DRAWN BY:	SHEET NO.:
DATE:	PLATE E-5.3	DN. NO.:



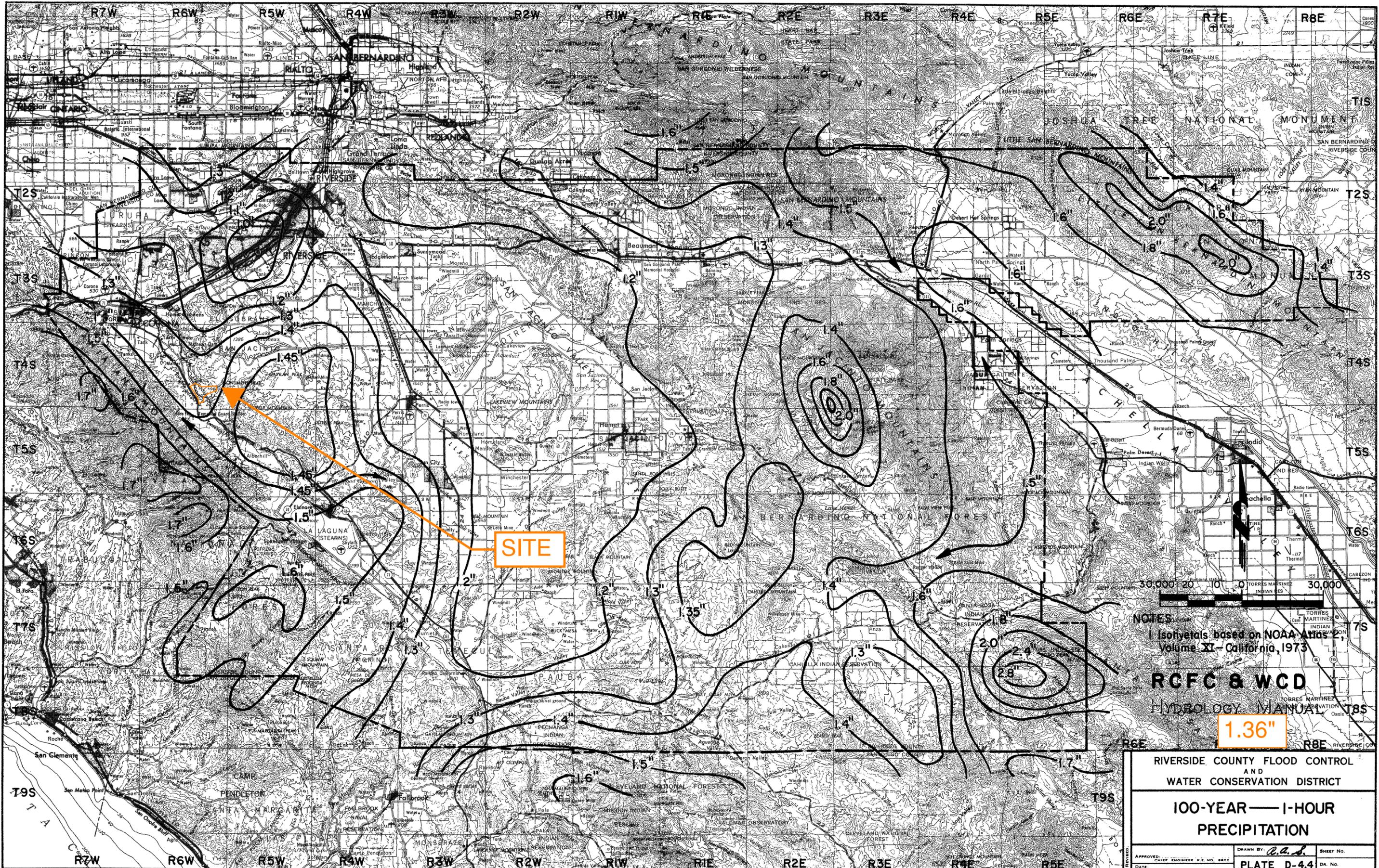
SITE

NOTES:
 1. Isohyets from NOAA Atlas 2
 Volume XI - California, 1973.

RCFC & WCD
 HYDROLOGY MANUAL

1.98"

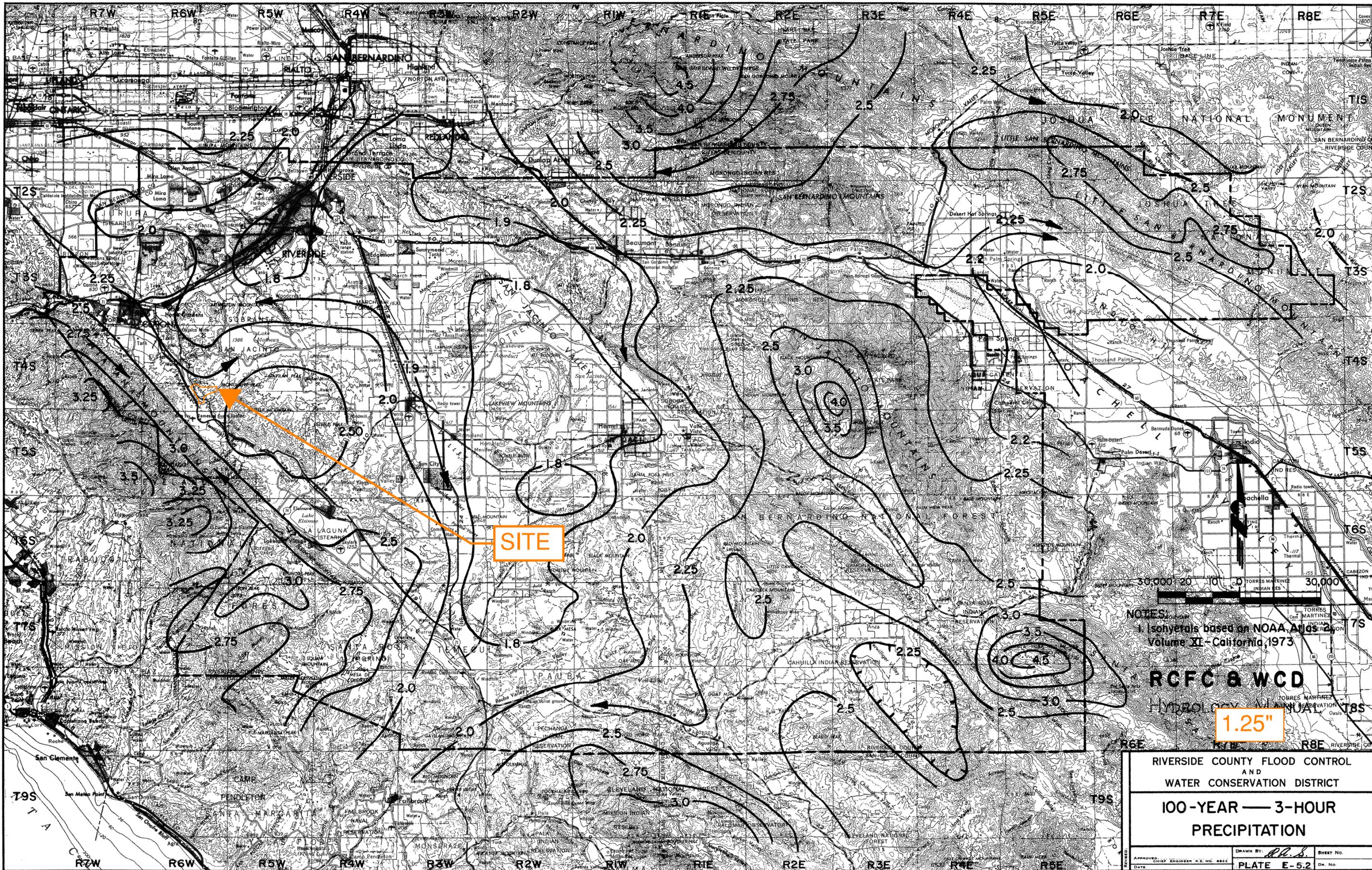
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 24-HOUR PRECIPITATION		
APPROVED: CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: R.A.S.	SHEET NO.
DATE:	PLATE E-5.5	DR. NO.



NOTES:
 Isohyets based on NOAA Atlas
 Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL
1.36"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
100-YEAR — 1-HOUR PRECIPITATION		
APPROVED: _____ CHIEF ENGINEER P.E. NO. 4822	DRAWN BY: <i>C.A.S.</i>	SHEET NO. _____
DATE: _____	PLATE D-4.4	Dr. No. _____



SITE

NOTES:
 1. Isohyets based on NOAA Atlas 2
 Volume XI - California, 1973

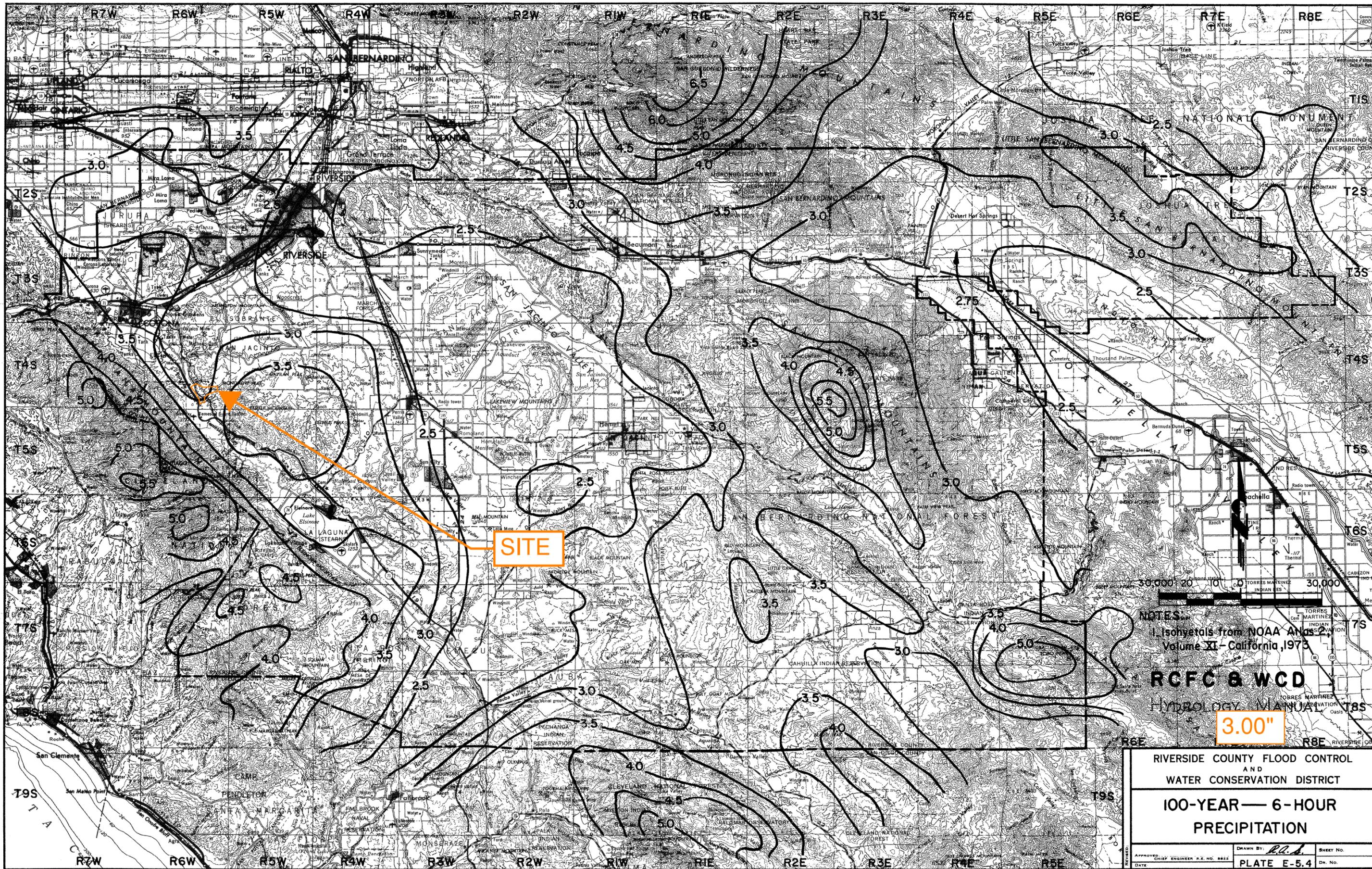
RCFC & WCD

HYDROLOGICAL

1.25"

**RIVERSIDE COUNTY FLOOD CONTROL
 AND
 WATER CONSERVATION DISTRICT
 100-YEAR — 3-HOUR
 PRECIPITATION**

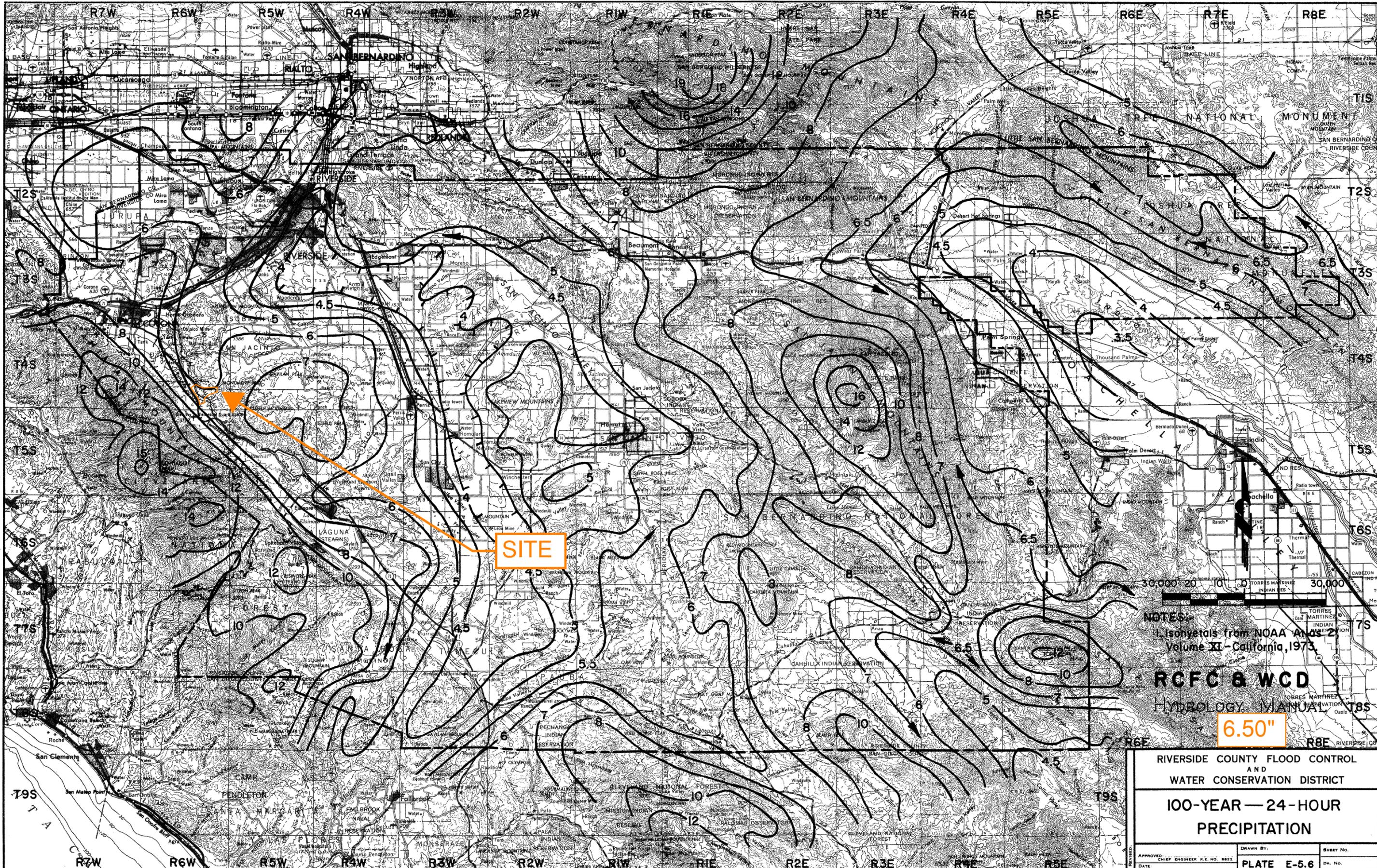
APPROVED: _____ DATE: _____
 DRAWN BY: *R.P.S.* SHEET NO. _____
 PLATE E-5.2 DR. NO. _____



NOTES:
 Isohyets from NOAA Atlas 2,
 Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL
3.00"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
100-YEAR — 6-HOUR PRECIPITATION	
APPROVED: DATE	CHIEF ENGINEER P.E. NO. 8822
DRAWN BY: PLATE E-5.4	Dr. No.



NOTES:
 1. Isohyets from NOAA Atlas 2,
 Volume XI - California, 1973.

RCFC & WCD
 HYDROLOGY MANUAL

6.50"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
100-YEAR — 24-HOUR PRECIPITATION		
APPROVED: CHIEF ENGINEER R.E. NO. 8822	DRAWN BY:	SHEET NO.
DATE:	PLATE E-5.6	DR. NO.

APPENDIX B

HYDROLOGY CALCULATIONS

EXISTING CONDITION

=====
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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* EXISTING CONDITION 100-YEAR *
* NODES 120-121 *

FILE NAME: W:\3905\E120.DAT
TIME/DATE OF STUDY: 15:34 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500
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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (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:

- Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (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 120.00 TO NODE 121.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
TC = K * [(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH (FEET) = 777.00
UPSTREAM ELEVATION (FEET) = 1022.00
DOWNSTREAM ELEVATION (FEET) = 950.50
ELEVATION DIFFERENCE (FEET) = 71.50
TC = 0.709 * [(777.00**3)/(71.50)]**.2 = 16.379
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.439
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6296
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF (CFS) = 15.36
TOTAL AREA (ACRES) = 10.00 TOTAL RUNOFF (CFS) = 15.36

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 10.0 TC (MIN.) = 16.38
PEAK FLOW RATE (CFS) = 15.36
=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
(RCFC&WCD) 1978 HYDROLOGY MANUAL
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(Rational Tabling Version 23.0)
Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* EXISTING CONDITION 100-YEAR *
* NODES 130-131 *

FILE NAME: W:\3905\E130.DAT
TIME/DATE OF STUDY: 15:37 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500
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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (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 130.00 TO NODE 131.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH (FEET) = 826.00
UPSTREAM ELEVATION (FEET) = 1034.00
DOWNSTREAM ELEVATION (FEET) = 950.00
ELEVATION DIFFERENCE (FEET) = 84.00
TC = 0.709*[(826.00**3)/(84.00)]**.2 = 16.452
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.434
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6292
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF (CFS) = 8.96
TOTAL AREA (ACRES) = 5.85 TOTAL RUNOFF (CFS) = 8.96
=====

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 5.8 TC (MIN.) = 16.45
PEAK FLOW RATE (CFS) = 8.96
=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
(RCFC&WCD) 1978 HYDROLOGY MANUAL
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(Rational Tabling Version 23.0)
Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* EXISTING CONDITION 100-YEAR *
* NODES 140-141 *

FILE NAME: W:\3905\E140.DAT
TIME/DATE OF STUDY: 15:40 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (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 140.00 TO NODE 141.00 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) = 985.00
UPSTREAM ELEVATION (FEET) = 950.00
DOWNSTREAM ELEVATION (FEET) = 939.77
ELEVATION DIFFERENCE (FEET) = 10.23
TC = 0.533*[(985.00**3)/(10.23)]**.2 = 20.916
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.185
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3919
SOIL CLASSIFICATION IS "A"
SUBAREA RUNOFF (CFS) = 4.97
TOTAL AREA (ACRES) = 5.80 TOTAL RUNOFF (CFS) = 4.97

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 5.8 TC (MIN.) = 20.92
PEAK FLOW RATE (CFS) = 4.97

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)
(Rational Tabling Version 23.0)
Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* EXISTING CONDITION 100-YEAR *
* NODES 150-151 *

FILE NAME: W:\3905\E150.DAT
TIME/DATE OF STUDY: 16:18 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500
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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (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 150.00 TO NODE 151.00 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) = 445.00
UPSTREAM ELEVATION (FEET) = 963.00
DOWNSTREAM ELEVATION (FEET) = 949.23
ELEVATION DIFFERENCE (FEET) = 13.77
TC = 0.533 * [(445.00**3) / (13.77)]**.2 = 12.236
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.781
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6538
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF (CFS) = 2.91
TOTAL AREA (ACRES) = 1.60 TOTAL RUNOFF (CFS) = 2.91

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 1.6 TC (MIN.) = 12.24
PEAK FLOW RATE (CFS) = 2.91

END OF RATIONAL METHOD ANALYSIS

PROPOSED CONDITION

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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* PROPOSED CONDITION 100-YEAR *
* NODES 100-144 *

FILE NAME: W:\3905\P100.DAT
TIME/DATE OF STUDY: 14:32 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500

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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS COMMERCIAL

TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH (FEET) = 347.00
UPSTREAM ELEVATION (FEET) = 942.98
DOWNSTREAM ELEVATION (FEET) = 934.24
ELEVATION DIFFERENCE (FEET) = 8.74
TC = 0.303*[(347.00**3)/(8.74)]**.2 = 6.569
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.680
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8801
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF (CFS) = 6.15
TOTAL AREA (ACRES) = 1.90 TOTAL RUNOFF (CFS) = 6.15

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM (FEET) = 930.24 DOWNSTREAM (FEET) = 928.86
FLOW LENGTH (FEET) = 159.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.9 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 5.90
ESTIMATED PIPE DIAMETER (INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 6.15
PIPE TRAVEL TIME (MIN.) = 0.45 Tc (MIN.) = 7.02
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 506.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 3.572
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8796
SOIL CLASSIFICATION IS "B"
SUBAREA AREA (ACRES) = 2.30 SUBAREA RUNOFF (CFS) = 7.23
TOTAL AREA (ACRES) = 4.2 TOTAL RUNOFF (CFS) = 13.38
TC (MIN.) = 7.02

FLOW PROCESS FROM NODE 102.00 TO NODE 124.00 IS CODE = 31

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-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 928.83 DOWNSTREAM(FEET) = 926.27
FLOW LENGTH(FEET) = 511.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.97
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.38
PIPE TRAVEL TIME(MIN.) = 1.43 Tc(MIN.) = 8.45
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 124.00 = 1017.00 FEET.

*****
FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS COMMERCIAL
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH(FEET) = 856.00
UPSTREAM ELEVATION(FEET) = 963.38
DOWNSTREAM ELEVATION(FEET) = 940.82
ELEVATION DIFFERENCE(FEET) = 22.56
TC = 0.303*[( 856.00**3)/( 22.56)]**.2 = 9.341
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.141
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8775
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 11.85
TOTAL AREA(ACRES) = 4.30 TOTAL RUNOFF(CFS) = 11.85

*****
FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 936.82 DOWNSTREAM(FEET) = 936.17
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 24.0 INCH PIPE IS 14.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.82
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.85
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 9.71
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 986.00 FEET.

*****
FLOW PROCESS FROM NODE 112.00 TO NODE 112.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.086
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8772
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.25 SUBAREA RUNOFF(CFS) = 0.68
TOTAL AREA(ACRES) = 4.6 TOTAL RUNOFF(CFS) = 12.53
TC(MIN.) = 9.71

*****
FLOW PROCESS FROM NODE 112.00 TO NODE 123.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 936.10 DOWNSTREAM(FEET) = 929.24
FLOW LENGTH(FEET) = 380.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.45
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.53
PIPE TRAVEL TIME(MIN.) = 0.67 Tc(MIN.) = 10.38
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 123.00 = 1366.00 FEET.

*****
FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 10.38
RAINFALL INTENSITY(INCH/HR) = 2.99
TOTAL STREAM AREA(ACRES) = 4.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.53

*****
FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS COMMERCIAL
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2

```

INITIAL SUBAREA FLOW-LENGTH(FEET) = 425.00
 UPSTREAM ELEVATION(FEET) = 943.30
 DOWNSTREAM ELEVATION(FEET) = 937.87
 ELEVATION DIFFERENCE(FEET) = 5.43
 $TC = 0.303 * [(425.00 ** 3) / (5.43)] ** .2 = 8.159$
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.338
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8785
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 1.76
 TOTAL AREA(ACRES) = 0.60 TOTAL RUNOFF(CFS) = 1.76

 FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 933.87 DOWNSTREAM(FEET) = 933.40
 FLOW LENGTH(FEET) = 12.00 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.77
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.76
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 8.19
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 437.00 FEET.

 FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.333
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8785
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) = 2.50 SUBAREA RUNOFF(CFS) = 7.32
 TOTAL AREA(ACRES) = 3.1 TOTAL RUNOFF(CFS) = 9.08
 TC(MIN.) = 8.19

 FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 933.40 DOWNSTREAM(FEET) = 929.53
 FLOW LENGTH(FEET) = 95.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.98
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.08
 PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 8.32
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 532.00 FEET.

 FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.32
 RAINFALL INTENSITY(INCH/HR) = 3.31
 TOTAL STREAM AREA(ACRES) = 3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.08

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	12.53	10.38	2.995	4.55
2	9.08	8.32	3.309	3.10

*****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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	19.11	8.32	3.309
2	20.74	10.38	2.995

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 20.74 Tc(MIN.) = 10.38
 TOTAL AREA(ACRES) = 7.7
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 123.00 = 1366.00 FEET.

 FLOW PROCESS FROM NODE 123.00 TO NODE 124.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 929.24 DOWNSTREAM(FEET) = 926.08

FLOW LENGTH(FEET) = 175.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.61
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.74
PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 10.66
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 124.00 = 1541.00 FEET.

FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 20.74 10.66 2.960 7.65
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 124.00 = 1541.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 13.38 8.45 3.286 4.20
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 124.00 = 1017.00 FEET.

*****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.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 29.82 8.45 3.286
2 32.79 10.66 2.960

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 32.79 Tc(MIN.) = 10.66
TOTAL AREA(ACRES) = 11.9

FLOW PROCESS FROM NODE 124.00 TO NODE 125.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 926.00 DOWNSTREAM(FEET) = 924.66
FLOW LENGTH(FEET) = 270.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.41
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.79
PIPE TRAVEL TIME(MIN.) = 0.61 Tc(MIN.) = 11.27
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 125.00 = 1811.00 FEET.

FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.887
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8760
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 6.70
TOTAL AREA(ACRES) = 14.5 TOTAL RUNOFF(CFS) = 39.49
TC(MIN.) = 11.27

FLOW PROCESS FROM NODE 125.00 TO NODE 126.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 924.66 DOWNSTREAM(FEET) = 923.11
FLOW LENGTH(FEET) = 310.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.81
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 39.49
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 11.93
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 126.00 = 2121.00 FEET.

FLOW PROCESS FROM NODE 126.00 TO NODE 126.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.814
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8756
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.74
TOTAL AREA(ACRES) = 14.8 TOTAL RUNOFF(CFS) = 40.23
TC(MIN.) = 11.93

FLOW PROCESS FROM NODE 126.00 TO NODE 127.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 923.11 DOWNSTREAM(FEET) = 922.74
FLOW LENGTH(FEET) = 75.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.79
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.23
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 12.09
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 127.00 = 2196.00 FEET.
*****
FLOW PROCESS FROM NODE 127.00 TO NODE 127.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.797
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.55 SUBAREA RUNOFF(CFS) = 1.35
TOTAL AREA(ACRES) = 15.4 TOTAL RUNOFF(CFS) = 41.58
TC(MIN.) = 12.09
*****
FLOW PROCESS FROM NODE 127.00 TO NODE 128.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 922.72 DOWNSTREAM(FEET) = 922.25
FLOW LENGTH(FEET) = 93.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.92
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.58
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 12.28
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 128.00 = 2289.00 FEET.
*****
FLOW PROCESS FROM NODE 128.00 TO NODE 128.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.777
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8753
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.55 SUBAREA RUNOFF(CFS) = 1.34
TOTAL AREA(ACRES) = 15.9 TOTAL RUNOFF(CFS) = 42.92
TC(MIN.) = 12.28
*****
FLOW PROCESS FROM NODE 128.00 TO NODE 129.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 922.25 DOWNSTREAM(FEET) = 921.41
FLOW LENGTH(FEET) = 168.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.92
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 42.92
PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 12.64
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 129.00 = 2457.00 FEET.
*****
FLOW PROCESS FROM NODE 129.00 TO NODE 129.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.741
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8751
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 2.28
TOTAL AREA(ACRES) = 16.9 TOTAL RUNOFF(CFS) = 45.20
TC(MIN.) = 12.64
*****
FLOW PROCESS FROM NODE 129.00 TO NODE 143.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 921.41 DOWNSTREAM(FEET) = 921.25
FLOW LENGTH(FEET) = 33.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.87
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 45.20
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 12.71
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 143.00 = 2490.00 FEET.
*****
FLOW PROCESS FROM NODE 143.00 TO NODE 143.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====
*****
FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 IS CODE = 21

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-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
-----
      ASSUMED INITIAL SUBAREA UNIFORM
      DEVELOPMENT IS COMMERCIAL
      TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
      INITIAL SUBAREA FLOW-LENGTH(FEET) = 602.00
      UPSTREAM ELEVATION(FEET) = 955.50
      DOWNSTREAM ELEVATION(FEET) = 944.36
      ELEVATION DIFFERENCE(FEET) = 11.14
      TC = 0.303*[(602.00**3)/(11.14)]**.2 = 8.709
      100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.241
      COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8780
      SOIL CLASSIFICATION IS "B"
      SUBAREA RUNOFF(CFS) = 11.81
      TOTAL AREA(ACRES) = 4.15 TOTAL RUNOFF(CFS) = 11.81

*****
FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 940.36 DOWNSTREAM(FEET) = 936.13
FLOW LENGTH(FEET) = 378.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.87
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.81
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 9.51
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 980.00 FEET.

*****
FLOW PROCESS FROM NODE 132.00 TO NODE 132.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.116
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8774
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.45 SUBAREA RUNOFF(CFS) = 1.23
TOTAL AREA(ACRES) = 4.6 TOTAL RUNOFF(CFS) = 13.04
TC(MIN.) = 9.51

*****
FLOW PROCESS FROM NODE 132.00 TO NODE 133.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 936.13 DOWNSTREAM(FEET) = 931.67
FLOW LENGTH(FEET) = 129.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.04
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 9.68
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 133.00 = 1109.00 FEET.

*****
FLOW PROCESS FROM NODE 133.00 TO NODE 133.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.090
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8772
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 2.50 SUBAREA RUNOFF(CFS) = 6.78
TOTAL AREA(ACRES) = 7.1 TOTAL RUNOFF(CFS) = 19.82
TC(MIN.) = 9.68

*****
FLOW PROCESS FROM NODE 133.00 TO NODE 134.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
-----
ELEVATION DATA: UPSTREAM(FEET) = 931.53 DOWNSTREAM(FEET) = 930.38
FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.53
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.82
PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 10.27
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 134.00 = 1339.00 FEET.

*****
FLOW PROCESS FROM NODE 134.00 TO NODE 134.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
-----
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.010
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8768
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 2.15 SUBAREA RUNOFF(CFS) = 5.67
TOTAL AREA(ACRES) = 9.2 TOTAL RUNOFF(CFS) = 25.49
TC(MIN.) = 10.27

*****
FLOW PROCESS FROM NODE 134.00 TO NODE 135.00 IS CODE = 31

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 930.36 DOWNSTREAM(FEET) = 929.06
FLOW LENGTH(FEET) = 260.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.98
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 25.49
PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 10.89
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 135.00 = 1599.00 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.931
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8763
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 4.88
TOTAL AREA(ACRES) = 11.1 TOTAL RUNOFF(CFS) = 30.37
TC(MIN.) = 10.89

FLOW PROCESS FROM NODE 135.00 TO NODE 142.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 929.04 DOWNSTREAM(FEET) = 927.56
FLOW LENGTH(FEET) = 295.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.12
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 30.37
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 11.58
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 142.00 = 1894.00 FEET.

FLOW PROCESS FROM NODE 142.00 TO NODE 142.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 11.58
RAINFALL INTENSITY(INCH/HR) = 2.85
TOTAL STREAM AREA(ACRES) = 11.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.37

FLOW PROCESS FROM NODE 140.00 TO NODE 141.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS COMMERCIAL
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH(FEET) = 884.00
UPSTREAM ELEVATION(FEET) = 954.96
DOWNSTREAM ELEVATION(FEET) = 936.62
ELEVATION DIFFERENCE(FEET) = 18.34
TC = 0.303*[(884.00**3)/(18.34)]**.2 = 9.926
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.056
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8770
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 10.72
TOTAL AREA(ACRES) = 4.00 TOTAL RUNOFF(CFS) = 10.72

FLOW PROCESS FROM NODE 141.00 TO NODE 142.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 932.62 DOWNSTREAM(FEET) = 927.64
FLOW LENGTH(FEET) = 90.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.00
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.72
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 10.03
LONGEST FLOWPATH FROM NODE 140.00 TO NODE 142.00 = 974.00 FEET.

FLOW PROCESS FROM NODE 142.00 TO NODE 142.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.03
RAINFALL INTENSITY(INCH/HR) = 3.04
TOTAL STREAM AREA(ACRES) = 4.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.72

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	30.37	11.58	2.851	11.15
2	10.72	10.03	3.041	4.00

*****WARNING*****
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCF&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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	37.03	10.03	3.041
2	40.42	11.58	2.851

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 40.42 Tc (MIN.) = 11.58
 TOTAL AREA (ACRES) = 15.1
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 142.00 = 1894.00 FEET.

 FLOW PROCESS FROM NODE 142.00 TO NODE 143.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 927.54 DOWNSTREAM (FEET) = 922.27
 FLOW LENGTH (FEET) = 259.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.4 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 13.20
 ESTIMATED PIPE DIAMETER (INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 40.42
 PIPE TRAVEL TIME (MIN.) = 0.33 Tc (MIN.) = 11.91
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 143.00 = 2153.00 FEET.

 FLOW PROCESS FROM NODE 143.00 TO NODE 143.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	40.42	11.91	2.816	15.15

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 143.00 = 2153.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	45.20	12.71	2.735	16.85

LONGEST FLOWPATH FROM NODE 110.00 TO NODE 143.00 = 2490.00 FEET.

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	82.78	11.91	2.816
2	84.45	12.71	2.735

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 84.45 Tc (MIN.) = 12.71
 TOTAL AREA (ACRES) = 32.0

 FLOW PROCESS FROM NODE 143.00 TO NODE 144.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 921.23 DOWNSTREAM (FEET) = 920.11
 FLOW LENGTH (FEET) = 224.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 45.0 INCH PIPE IS 34.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 9.28
 ESTIMATED PIPE DIAMETER (INCH) = 45.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 84.45
 PIPE TRAVEL TIME (MIN.) = 0.40 Tc (MIN.) = 13.11
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 144.00 = 2714.00 FEET.

 FLOW PROCESS FROM NODE 144.00 TO NODE 144.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.696
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8748
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA (ACRES) = 1.55 SUBAREA RUNOFF (CFS) = 3.66
 TOTAL AREA (ACRES) = 33.5 TOTAL RUNOFF (CFS) = 88.11
 TC (MIN.) = 13.11

```
*****
FLOW PROCESS FROM NODE 144.00 TO NODE 144.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 1 <<<<
=====
*****
FLOW PROCESS FROM NODE 144.00 TO NODE 144.00 IS CODE = 12
-----
>>>>CLEAR MEMORY BANK # 2 <<<<
=====
=====
END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 33.5 TC (MIN.) = 13.11
PEAK FLOW RATE (CFS) = 88.11
=====
=====
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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* PROPOSED CONDITION 100-YEAR *
* NODES 150-151 *

FILE NAME: W:\3905\P150.DAT
TIME/DATE OF STUDY: 17:11 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500

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

NO.	HALF- CROWN TO		STREET-CROSSFALL:	CURB	GUTTER-GEOMETRIES:				MANNING
	WIDTH	CROSSFALL			IN- / OUT- / PARK-	HEIGHT	WIDTH	LIP	
	(FT)	(FT)	SIDE / SIDE / WAY	(FT)	(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 150.00 TO NODE 151.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS COMMERCIAL

TC = K * [(LENGTH**3) / (ELEVATION CHANGE)]**0.2
INITIAL SUBAREA FLOW-LENGTH (FEET) = 204.00
UPSTREAM ELEVATION (FEET) = 941.27
DOWNSTREAM ELEVATION (FEET) = 934.20
ELEVATION DIFFERENCE (FEET) = 7.07
TC = 0.303 * [(204.00**3) / (7.07)]**0.2 = 4.983
COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.161
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8819
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF (CFS) = 3.49
TOTAL AREA (ACRES) = 0.95 TOTAL RUNOFF (CFS) = 3.49

=====

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 0.9 TC (MIN.) = 5.00
PEAK FLOW RATE (CFS) = 3.49

=====

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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* TEMESCAL VALLEY COMMERCE CENTER *
* EXISTING CONDITION 100-YEAR *
* NODES 160-161 *

FILE NAME: W:\3905\P160.DAT
TIME/DATE OF STUDY: 17:15 01/06/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
2-YEAR, 1-HOUR PRECIPITATION (INCH) = 0.530
100-YEAR, 1-HOUR PRECIPITATION (INCH) = 1.360
COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY (INCH/HOUR) = 1.360
SLOPE OF INTENSITY DURATION CURVE = 0.4500
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

NO.	HALF- CROWN TO		STREET-CROSSFALL:		CURB	GUTTER-GEOMETRIES:				MANNING
	WIDTH	CROSSFALL	IN-	OUT-/PARK-		HEIGHT	WIDTH	LIP	HIKE	
(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:

- Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (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 160.00 TO NODE 161.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS COMMERCIAL

TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH (FEET) = 104.00
UPSTREAM ELEVATION (FEET) = 934.29
DOWNSTREAM ELEVATION (FEET) = 930.23
ELEVATION DIFFERENCE (FEET) = 4.06
TC = 0.303*[(104.00**3)/(4.06)]**.2 = 3.716
COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.161
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8819
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF (CFS) = 1.28
TOTAL AREA (ACRES) = 0.35 TOTAL RUNOFF (CFS) = 1.28

=====

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 0.3 TC (MIN.) = 5.00
PEAK FLOW RATE (CFS) = 1.28

=====

END OF RATIONAL METHOD ANALYSIS

APPENDIX C

HYDROLOGY MAPS



LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER
t_c	TIME OF CONCENTRATION
Q_{100}	DISCHARGE (CUBIC FEET PER SECOND) NUMBER DESIGNATE YEAR OF FREQUENCY

COUNTY OF RIVERSIDE
 PUBLIC WORKS DEPARTMENT
**EXISTING CONDITION
 HYDROLOGY MAP
 TEMESCAL VALLEY COMMERCE
 CENTER**

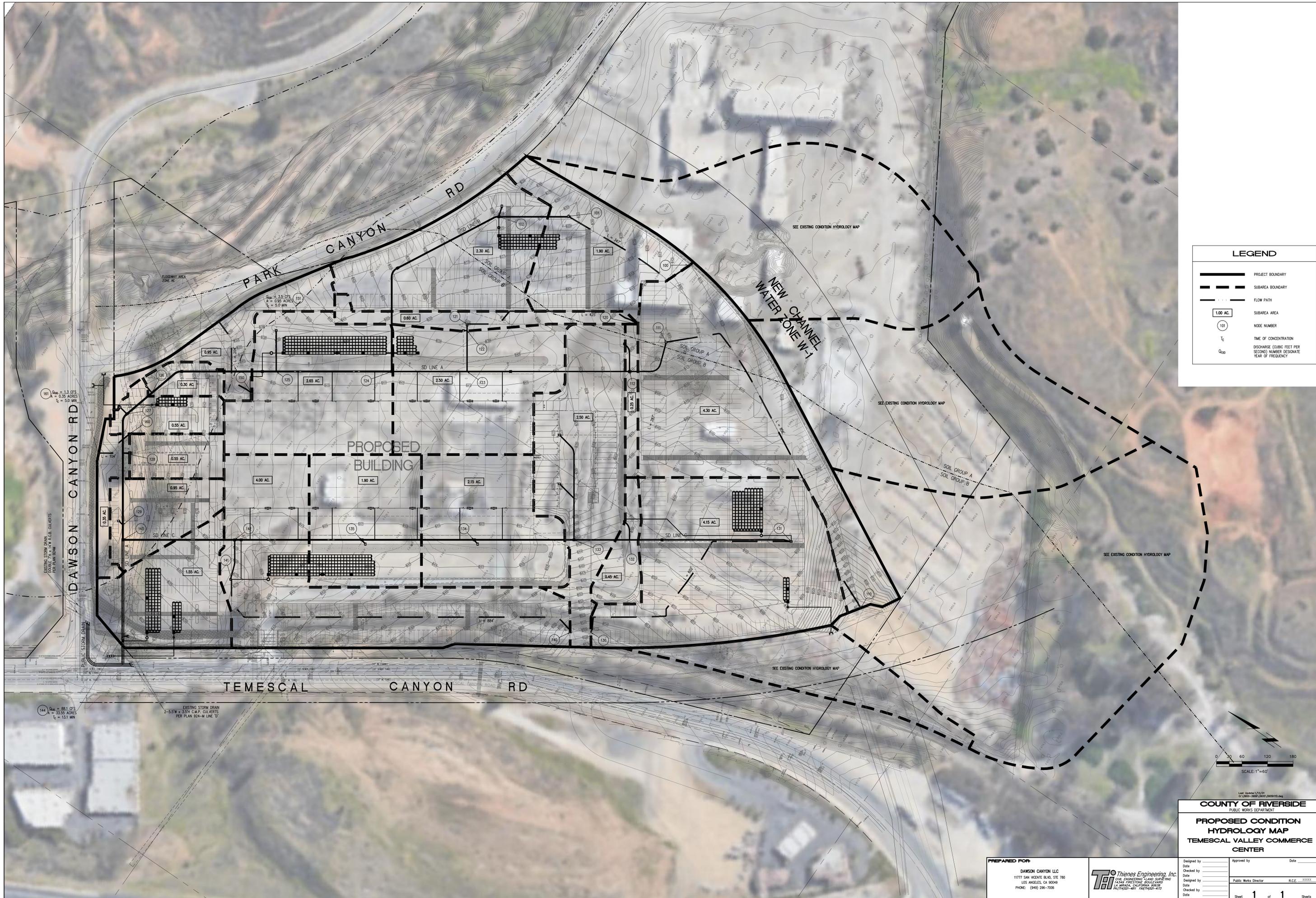
Designed by _____	Approved by _____
Date _____	Date _____
Checked by _____	Public Works Director _____
Date _____	R.C.E. _____
Checked by _____	
Date _____	

Sheet **1** of **1** Sheets

PREPARED FOR:
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Last Update: 1/9/21
 15300-1000-0000-000000-01.dwg



LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER
T_c	TIME OF CONCENTRATION
Q_{100}	DISCHARGE (CUBIC FEET PER SECOND) NUMBER DESIGNATE YEAR OF FREQUENCY

161 $Q_{100} = 1.1 \text{ CFS}$
 $A = 0.35 \text{ ACRES}$
 $T_c = 5.0 \text{ MIN}$

144 $Q_{100} = 88.1 \text{ CFS}$
 $A = 33.55 \text{ ACRES}$
 $T_c = 13.1 \text{ MIN}$

EXISTING STORM DRAIN
 2'-5.5" W x 3.5" C.M.P. COLLARIS
 PER PLAN 924-W LINE 'D'



COUNTY OF RIVERSIDE
 PUBLIC WORKS DEPARTMENT
**PROPOSED CONDITION
 HYDROLOGY MAP**
 TEMESCAL VALLEY COMMERCE
 CENTER

PREPARED FOR:
 DAWSON CANYON LLC
 11777 SAN VICENTE BLVD, STE 780
 LOS ANGELES, CA 90049
 PHONE: (849) 296-7006



Designed by _____	Approved by _____	Date _____
Checked by _____	Public Works Director _____	R.C.E. XXXXX
Designed by _____		
Checked by _____		
Date _____		

Sheet **1** of **1** Sheets