

# Riverside County

APN: 462-182-018 & 462-185-006

Winchester, California

## Preliminary Hydrology Study

**September 26, 2022**

Prepared for:

No Worries RV Storage



Prepared by:

Hzayen Design Group, Inc.  
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9/26/2022

RIVERSIDE COUNTY  
TRANSPORTATION DEPT  
**DRAINAGE REPORT  
PRELIMINARY  
APPROVAL**

Date: 10/28/22 By: R.Tebben

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RCE

Date

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- a. *Existing Runoff, 2-year storm event*
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## INTRODUCTION

The project is located in the Winchester, California, West of Winchester Road, North of Haddock Street. The entire project is located within the limits of Riverside County and contains roughly 3.53-acre. The current land is currently undeveloped land with poor cover; the proposed development will re grade the site and will result in the development of an RV parking lot..

The purpose of this report is to facilitate the planning and implementation of drainage infrastructure improvements to accommodate storm water runoff in the general vicinity of the proposed development of both Parcels; APNs: 462-182-018 & 462-185-006 In the county of Riverside.

This report includes an evaluation of existing drainage conditions, alternative storm drainage solutions and any other development structure that will be proposed as a part of the development of the storm water system within this project. The results of this report will be the basis for future storm drainage improvements solely for this project.

This report addresses the impacts from a 10-year and 100-year 24-hour design storm events. Its intended use is for the development of drainage infrastructure solely by the project.

The following information is contained within this report:

- A description of the existing drainage conditions within the study area.
- Proposed Storm drain line within project boundary.
- Watershed catchment's boundaries and hydrologic information that support the drainage infrastructure plan. The County Rational Method has been used as the basis for hydrologic evaluations. Discharges expected at the southwest corner of the project similar to existing conditions.

## AUTHORIZATION

This report has been performed at the request of the Consultant to determine the existing drainage patterns and any storm drainage impacts from the proposed development on the study area. It is not the intent of this report to suggest remediation for any regional drainage issues outside of the project area.

## STUDY APPROACH

The current storm water is sheet flowing from the north part of the property to the south side, it leaves the property and it discharges to at the southwest corner of the property

As a part of the development of this project a storm drain line will be constructed within the property to collect the onsite storm runoff to the existing discharge point at the west side of the property at Haddock Street.

The primary objective relating to storm water conveyance is to satisfy the County of Riverside policy that will address the existing and proposed conditions and analyze both existing and proposed conditions per the county of riverside hydrology manual. This will be accomplished with the use of permanent storm drain system that will be constructed as a part of the development of this project. It's not the intention of this study to address any offsite or regional storm water issue within the County of Riverside.

## SUMMARY OF HYDROLOGIC CONDITIONS

The development site was analyzed for several storm rain events per the Riverside County Guideline. The proposed project is designed to match the existing conditions since there is no actual change in the storm patterns or any major change in water course.

The storm water within the project will sheet flow and will be collected in the middle of the drive isle to two water quality basins, runoff then will be collected in a storm drain system and discharged on Haddock street at the westerly side of the property similar to its existing conditions.

The development of this property will have no impact on the runoff as existing and proposed peak runoff has not changed due to maintaining the majority of the site as a pervious surface there is no change in runoff between existing and proposed onsite conditions, the area downstream of the project should not be adversely impacted by this development.

Offsite Streets has been analyzed for development to compare pre and post development impact on the discharge downstream, the development of streets increased impervious surface in return increased overall flow, the increase in discharge between existing and proposed conditions on every street is less than significant as each street increases flow by less than half of cubic foot per second for a 10 year storm and less than 0.56 cfs for a 100 year storm, never the less this development will mitigate for this increase by constructing a basin along Winchester that will reduce the flow downstream. The development will also construct a containment basin in the parkway along the sidewalk of Haddock and Willard Streets.

Existing Conditions

	Area (acres)	Imp. %	Length	Elev. Diff.	TC	I10	I100	C10	C100	Q2	Q10	Q100
1A	3.54	0%	610'	4.0	14	1.71"	2.56"	0.663	0.730	2.3	4.01	6.62
2A	0.94	37%	775'	3.8	16	1.59"	2.39"	0.75	0.78	0.56	1.12	1.75
3A	0.26	41%	340'	1.5'	12.8	1.77"	2.66"	0.765	0.803	0.18	0.35	0.56
4A	0.27	0%	340'	2.5'	15	1.64"	2.47"	0.65	0.725	0.15	0.29	0.47

Proposed Conditions:

	Area (acres)	Imp. %	Length	Elev. Diff.	TC	I10	I100	C10	C100	Q10	Q100	ΔQ10	ΔQ100
1A	3.54	0%	610'	4.0'	14	1.71"	2.56"	0.663	0.730	4.01	6.62	0	0
2A	0.94	90%	775'	3.8	12	1.85"	2.77"	0.88	0.89	1.53	2.32	0.41	0.57
3A	0.26	86%	340'	1.5'	10	2.03"	3.05"	0.875	0.885	0.46	0.70	0.11	0.14
4A	0.27	85%	340'	2.5'	9	2.15"	3.22"	0.880	0.885	0.51	0.77	0.22	0.30

**PROJECT DESCRIPTION**

The project is located in the County of Riverside, North Haddock Street, West of Winchester Road. The entire project is located within the limits of Riverside County and contains roughly 3.54 acre. The current land is currently undeveloped land with poor cover; the proposed development will re grade the site and will result in the development of 1 commercial building.

The study area consists of approximately 3.54 acres. The study area consists of 1 sub-area due to the size of the project. The watershed is also defined by the physical constraints and topographic features that exist and points of interest in the study area. The natural slopes within the sub-basin area are roughly around 0.5% across the site.

Storm water runoff generated from the study area generally drains westerly as overland flow. Proposed development will maintain the same pattern by discharging the westerly corner of the property on Haddock Street.

### **SOIL PROPERTIES**

The soil predominately found within the Town soil boundaries in the study area was found to be in Group C. The soil type was identified from the current Soil Maps of the Riverside County Area, California. In General Soil permeability, runoff rates and land slopes were used to predict the storm water runoff quantities for evaluating storm drainage facilities. Group C Soils - Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.

### **PROPOSED DRAINAGE STUDY APPROACH**

The nature of this development as an RV Parking Lot with the usage of a pervious surface throughout the property will create similar conditions to pre development state which will minimize the impact on the downstream properties.

In order to adequately evaluate the impacts and requirements of the proposed project, the existing drainage conditions were analyzed. The purpose of this drainage study is to document the impacts of certain rainfall events on the study area. This information will be the basis of comparison between pre-development and post-development of storm drainage infrastructure improvements.

This proposed drainage description will analyze the effects of the 10 & 100-year 24-hour storm events within the study area.

Due to the nature of the project, a hydrograph method was chosen to estimate the design storm runoff. The Rational Method, as defined in the current County Hydrology Manual was employed to generate the effective runoff within the sub-area.

The County Hydrology Manual utilizes the Rational Method approach for its hydrologic calculations. This Method is understood to provide peak discharge relative

to rainfall intensity. Because this method is considered the 'standard of practice' for this area it will be used to generate the hydrographs contained herein.

$$Q = CiA$$

Where            C        = runoff coefficient  
                      i        = rainfall intensity (in/hr)  
                      A        = drainage area (ac)

The Rational Method assumes that rainfall intensity is uniform over the watershed and it continues for the time of concentration of the watershed. The time of concentration is the time required for rain falling on the most remote part of the basin to reach the basin outlet. The rainfall intensity was taken from County Standards. The runoff coefficient in the rational formula is dependent on the soil type, antecedent moisture condition, recurrence interval, land use, slope, amount of urban development, rainfall intensity, surface and channel roughness, and duration of storm.

### **HYDROMODIFICATION**

The development of this site as seen in Area 1A will not increase flow for any storm event includes 2-year storm, this proposed project will not create an HCOC, no extra mitigation will be required county WQMP guidelines.



## **APPENDIX 1: HYDROLOGY SUPPORTING DATA**

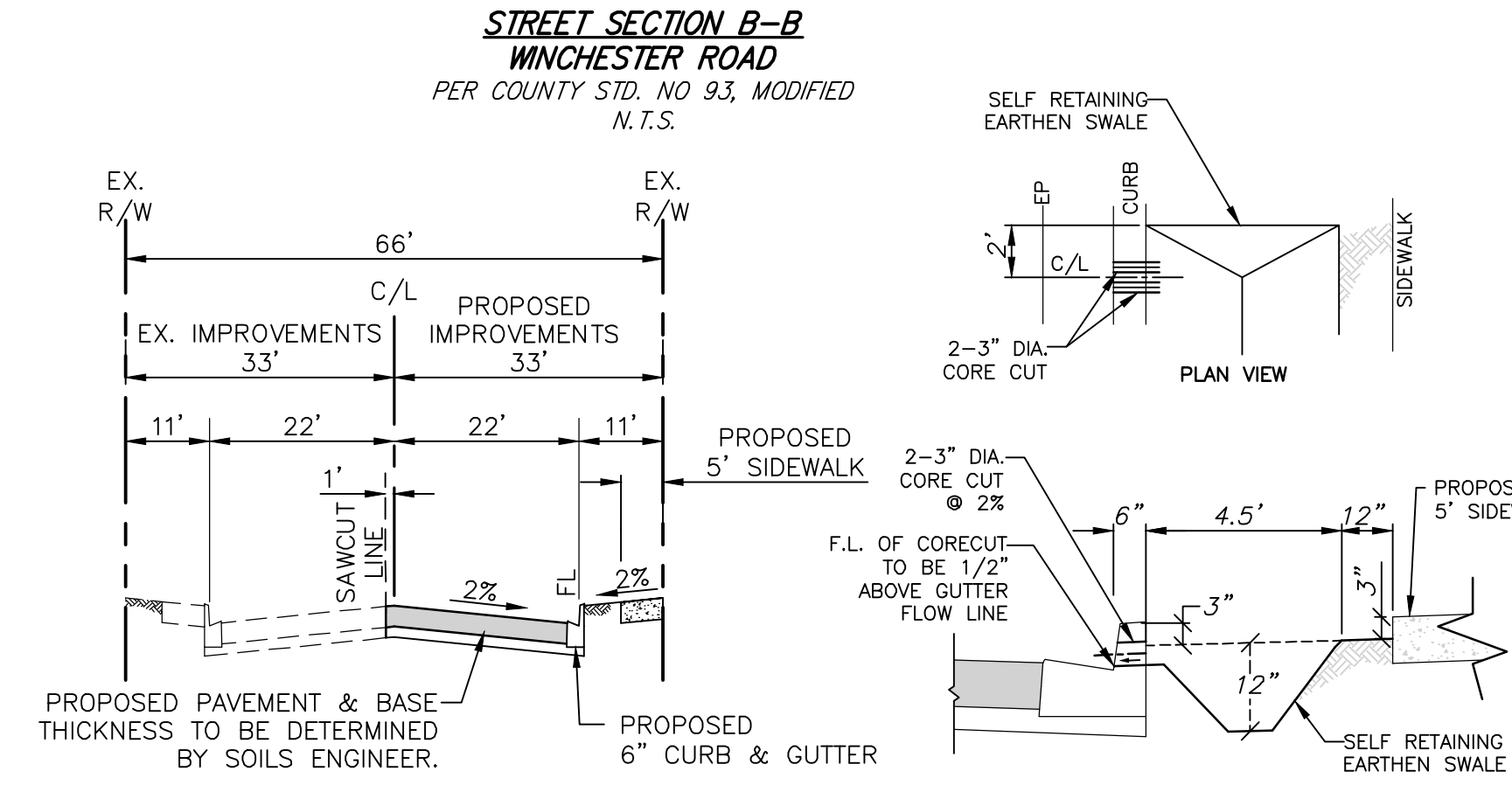
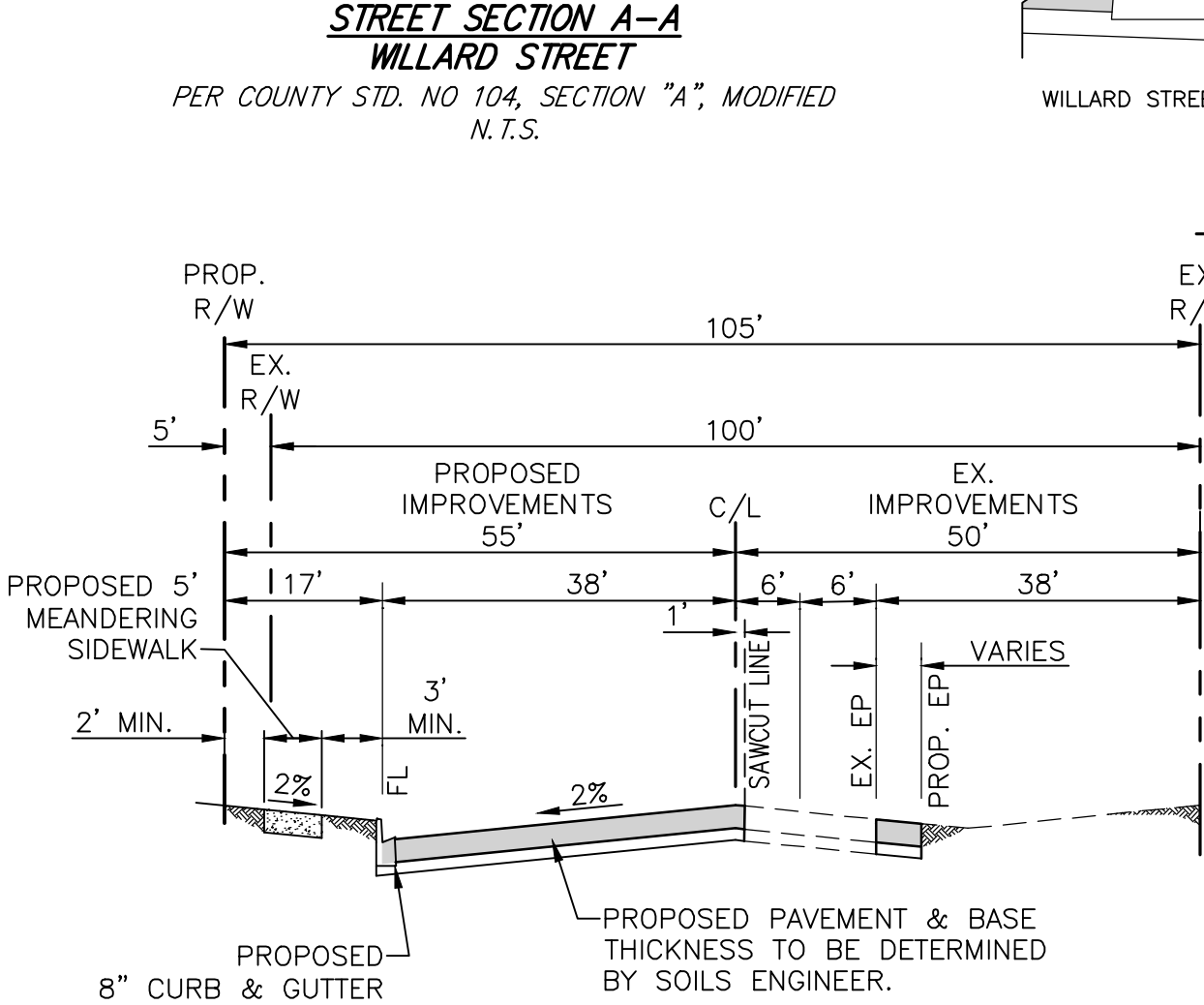
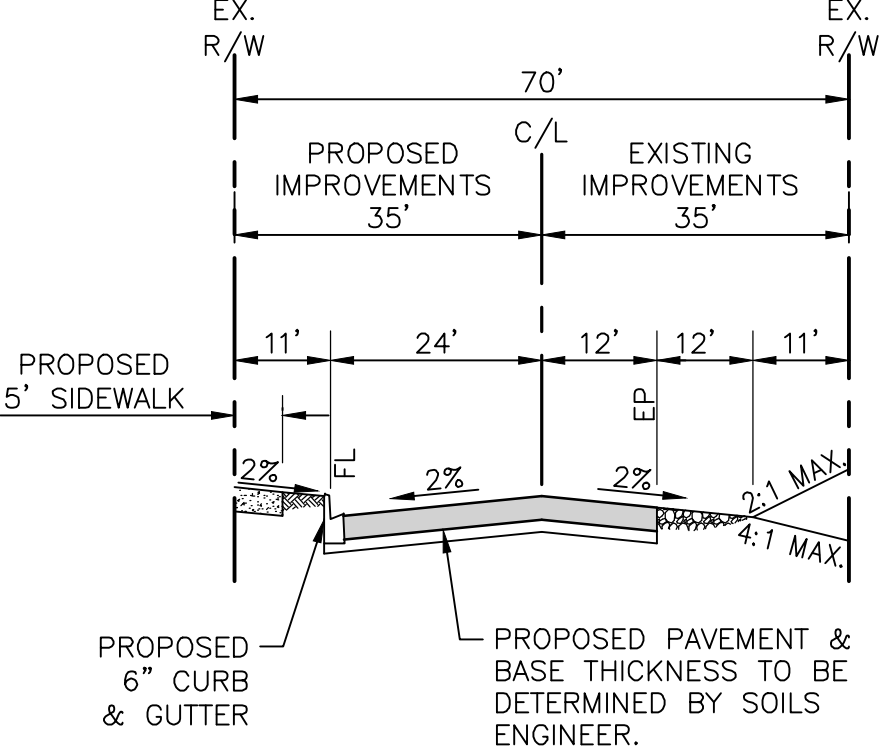
*Conceptual Grading Plan*  
*County Hydrology Manual Standard Tables &*  
*Flowmaster Analysis of Curb and Gutter Flow*  
*Isohyet Map 2 Year – 1 Hour*  
*Isohyet Map 100 Year – 1 Hour*  
*Isohyet Map 2 Year – 3 Hour*  
*Isohyet Map 100 Year – 3 Hour*  
*Isohyet Map 2 Year – 6 Hour*  
*Isohyet Map 100 Year – 6 Hour*  
*Isohyet Map 2 Year – 24 Hour*  
*Isohyet Map 100 Year – 24 Hour*  
*Soils Map*

## ***Conceptual Grading Plan***

**OWNER/APPLICANT**  
 NO WORRIES! RV AND BOAT STORAGE LLC  
 28447 WITHERSPOON PKWY  
 VALENCIA, CA 91355  
 OFFICE: (661) 295-1970  
 CONTACT NAME: TOM COMBER  
 CONTACT PHONE#: (661) 433-8062  
 EMAIL: TOM@RIVERANGELLC.COM

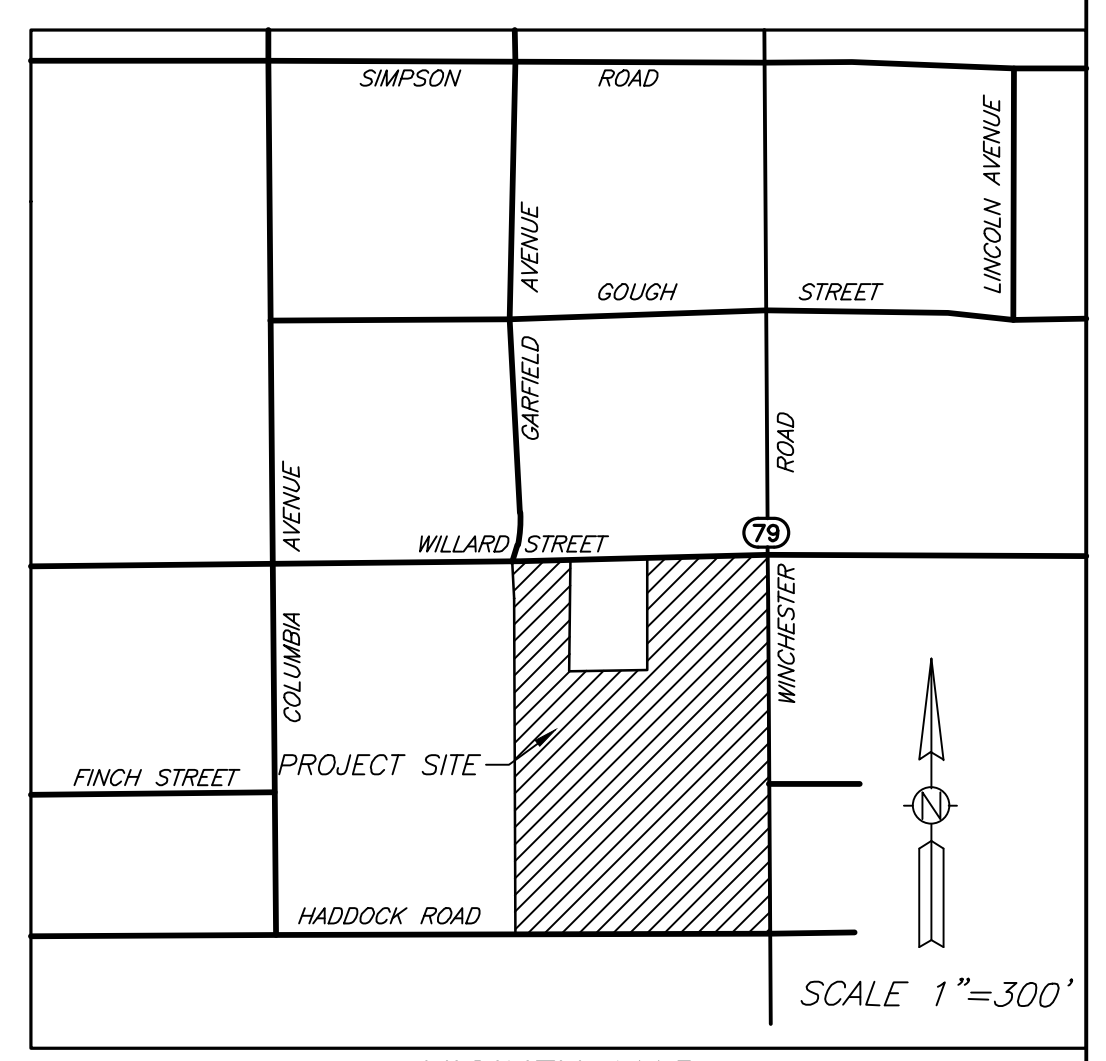
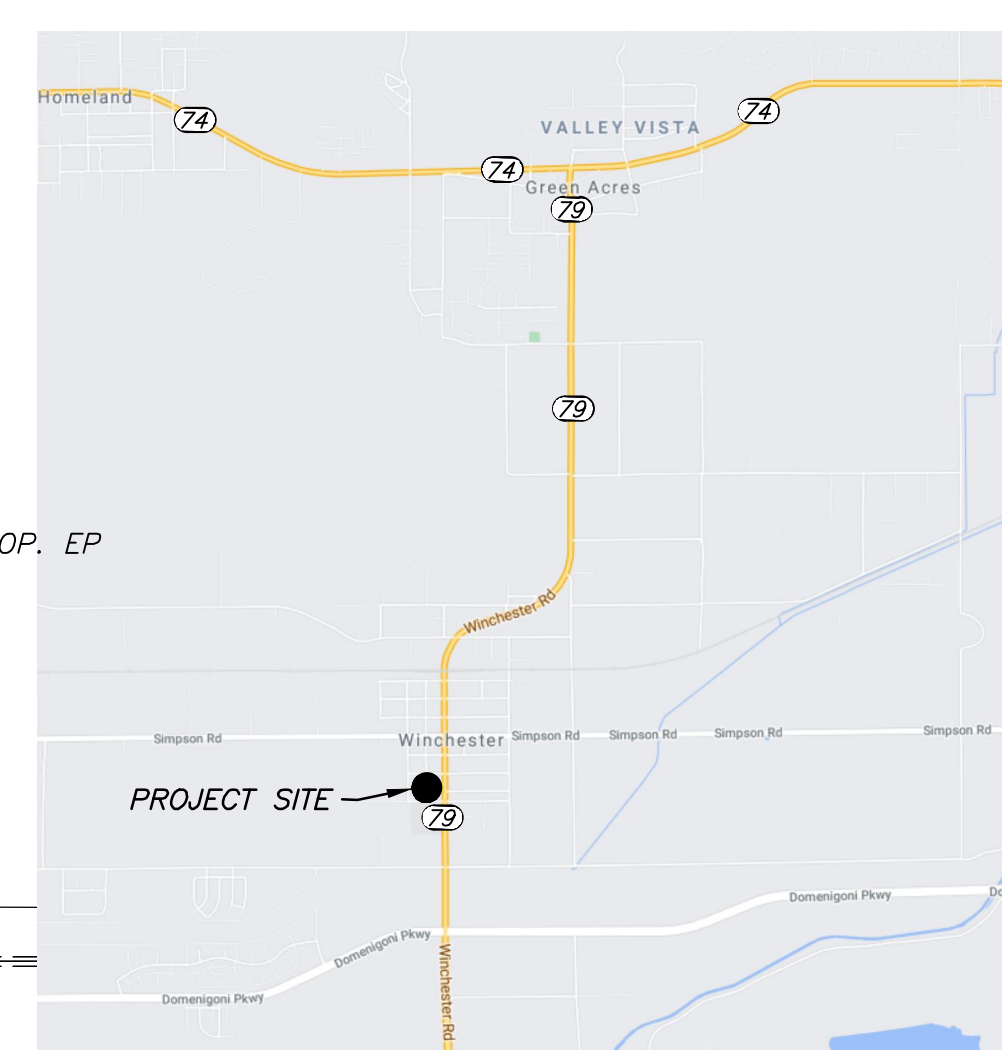
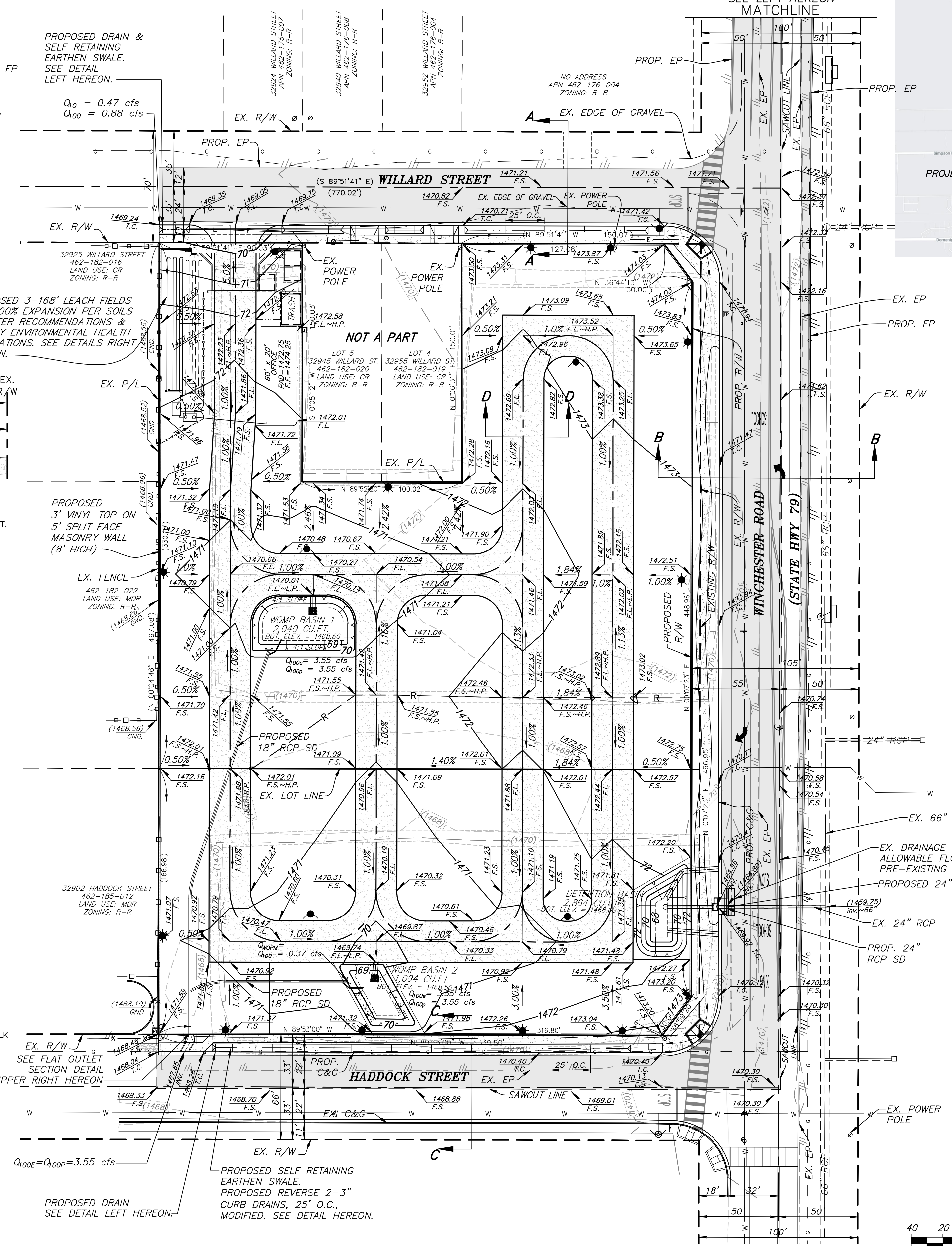
**ENGINEER/ EXHIBIT PREPARER**  
 HZAYEN DESIGN GROUP, INC.  
 360 TWILIGHT COURT,  
 CAMARILLO, CA 93012  
 OFFICE: (805) 233-7778  
 CONTACT: IBRAHIM HZAYEN  
 CELL: (818)461-2642  
 EMAIL: IHZAYEN@HZAYEN.COM

**ASSESSOR'S PARCEL No.**  
 462-182-018-6 & 462-185-006-4  
 GROSS ACRES: 3.53 ACRES  
 NET ACRES: N/A  
 ADDRESS: 32965 WILLARD ST., WINCHESTER, CA 92596



PREPARED BY:  
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**Hzayen Design Group, Inc**  
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 Camarillo, CA 93012  
 Phone (805) 233-7778

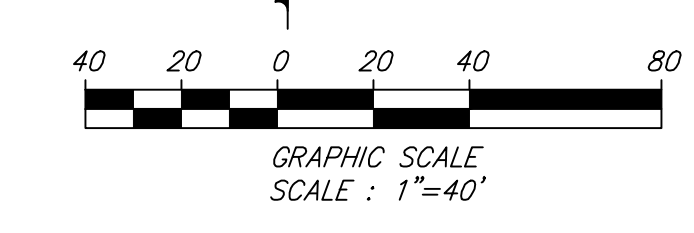
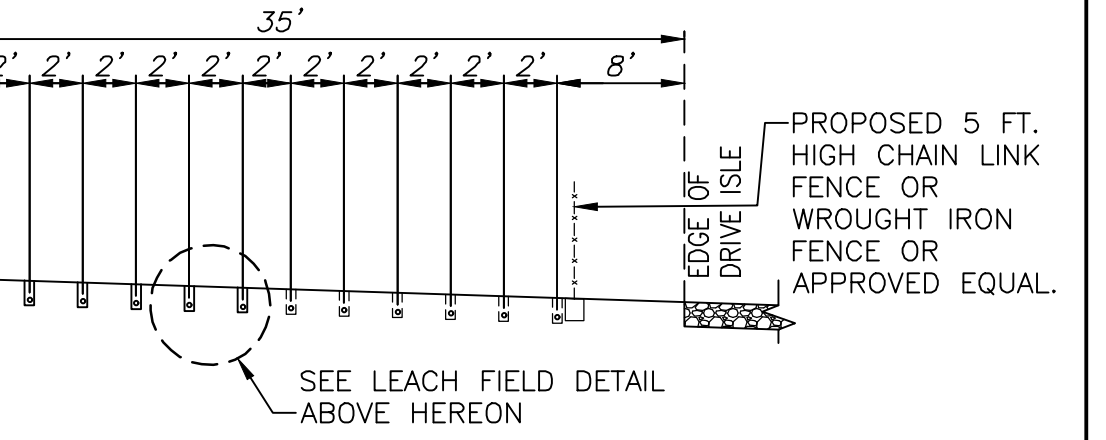
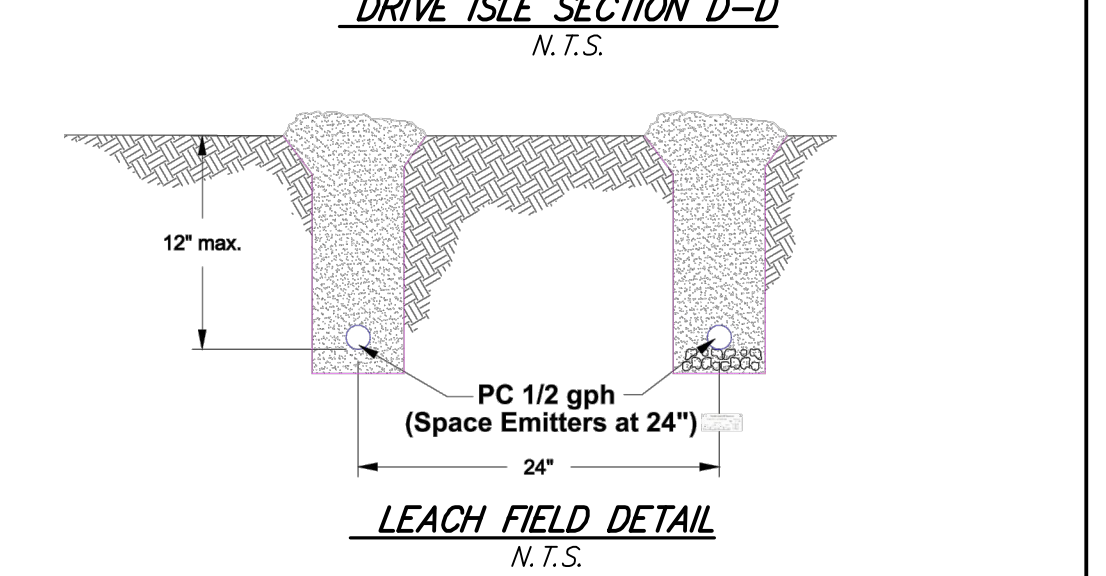
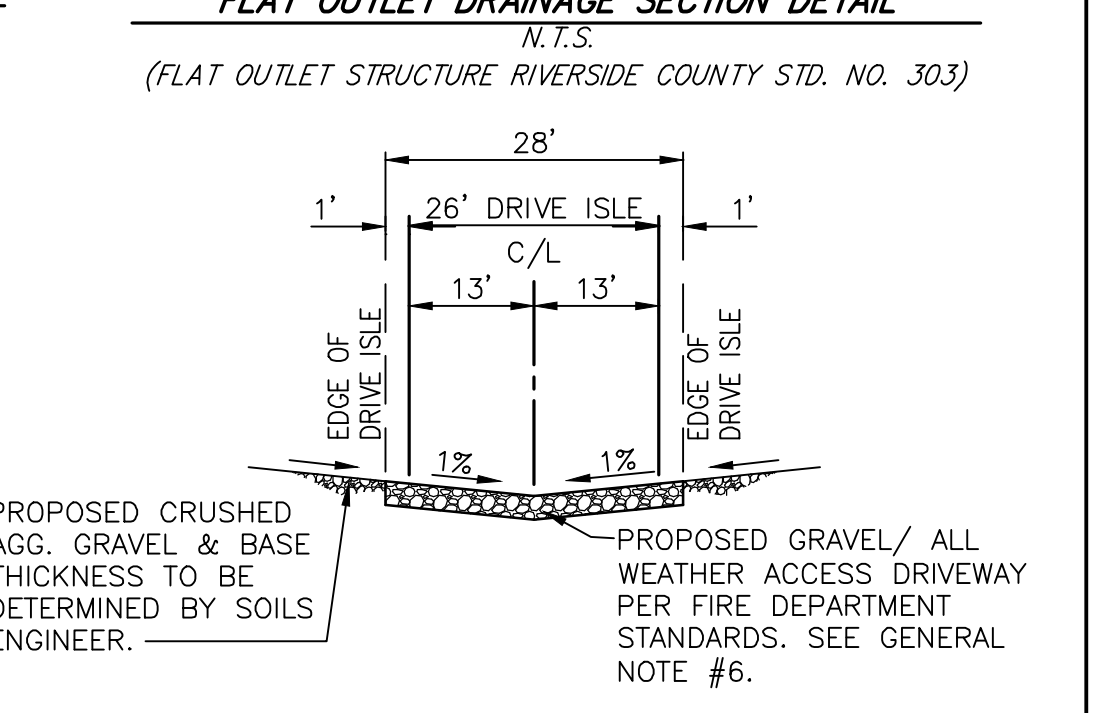
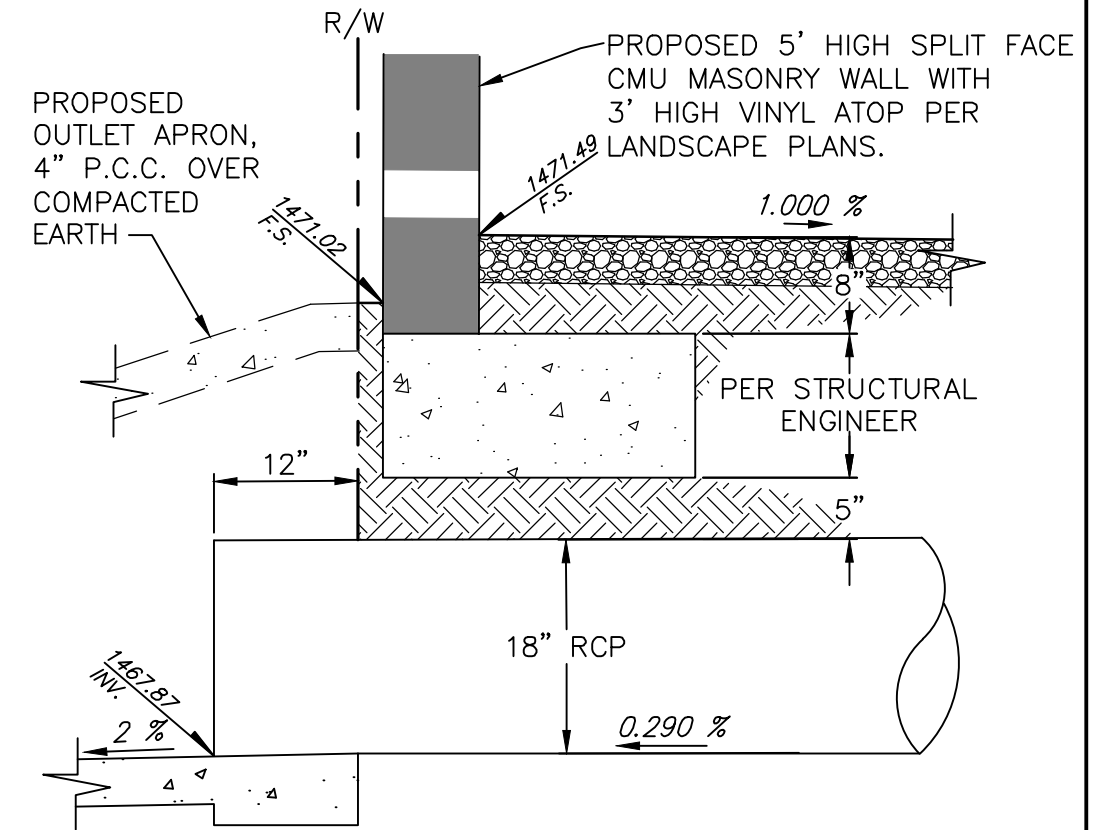
# CONCEPTUAL GRADING AND DRAINAGE COUNTY OF RIVERSIDE NO WORRIES! RV AND BOAT STORAGE



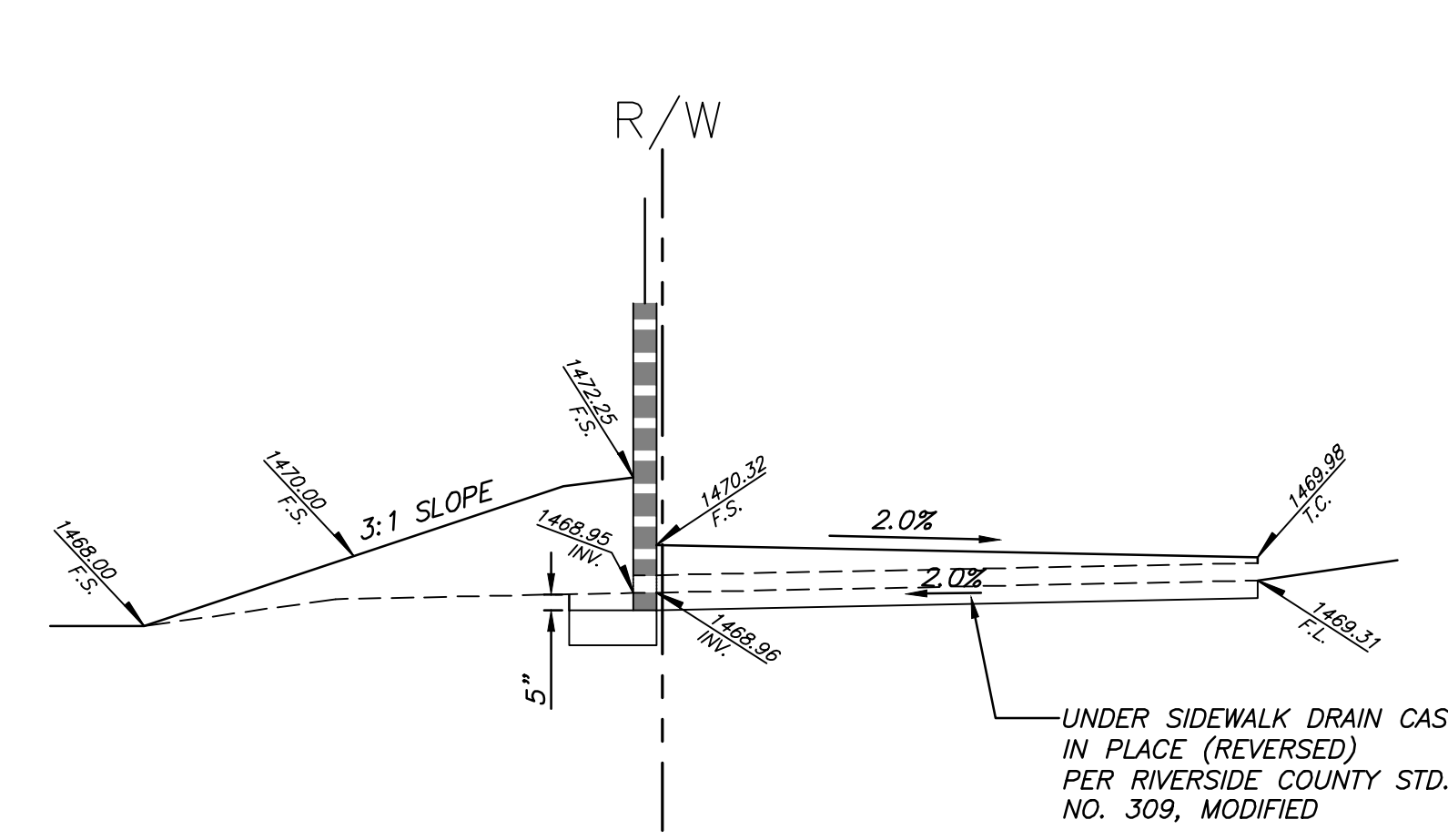
**LEGEND & ABBREVIATIONS**

- EXISTING PROPERTY LINE
- - - PROPOSED PROPERTY LINE
- - - EXISTING RIGHT-OF-WAY
- - - PROPOSED RIGHT-OF-WAY
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- - - EXISTING SLOPE
- R/W RIGHT-OF-WAY
- C/L CENTERLINE
- P/L PROPERTY LINE
- C&G CURB & GUTTER
- PROP. PROPOSED
- EX. EXISTING

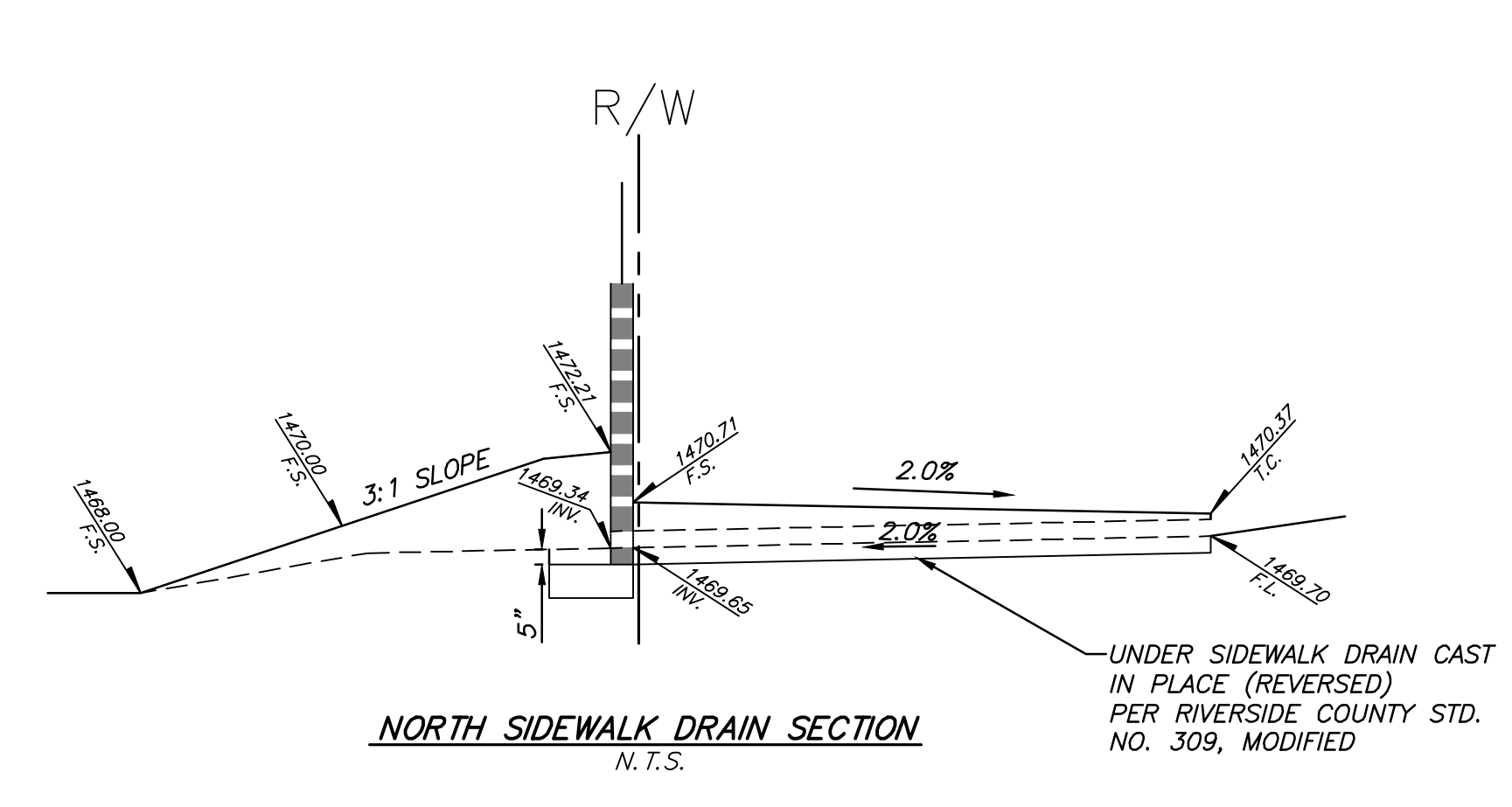
- GENERAL NOTES:**
- NO WORK IN PUBLIC RIGHT-OF-WAY WITHOUT AN ENCROACHMENT PERMIT.
  - THE PROJECT SITE IS RAW UNDEVELOPED LAND.
  - THE PROJECT SITE IS LOCATED WITHIN ZONE "X" AS SHOWN ON FLOOD INSURANCE RATE MAP, COMMUNITY NO. 080245, MAP NUMBER 080650808 WHICH BEARS AN EFFECTIVE DATE OF 04/19/2017 AND IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.
  - DRIVE LANES WILL BE CONSTRUCTED TO FIRE DEPT. REQUIREMENTS. THE DRIVE ISLE CONSTRUCTION SHALL BE MINIMUM OF CLASS II BASE OR DECOMPOSED GRANITE AND ABLE TO WITH STAND A MINIMUM GROSS VEHICULAR WEIGHT OF 75 THOUSAND POUNDS. SEE SECTION DETAIL "D-D" BELOW HEREON.
- RAW EARTHWORK QUANTITIES**
- CUT VOLUME 5,900 CU. YD.  
 FILL VOLUME 3,800 CU. YD.  
 NET VOLUME 2,100 CU. YD. EXPORT



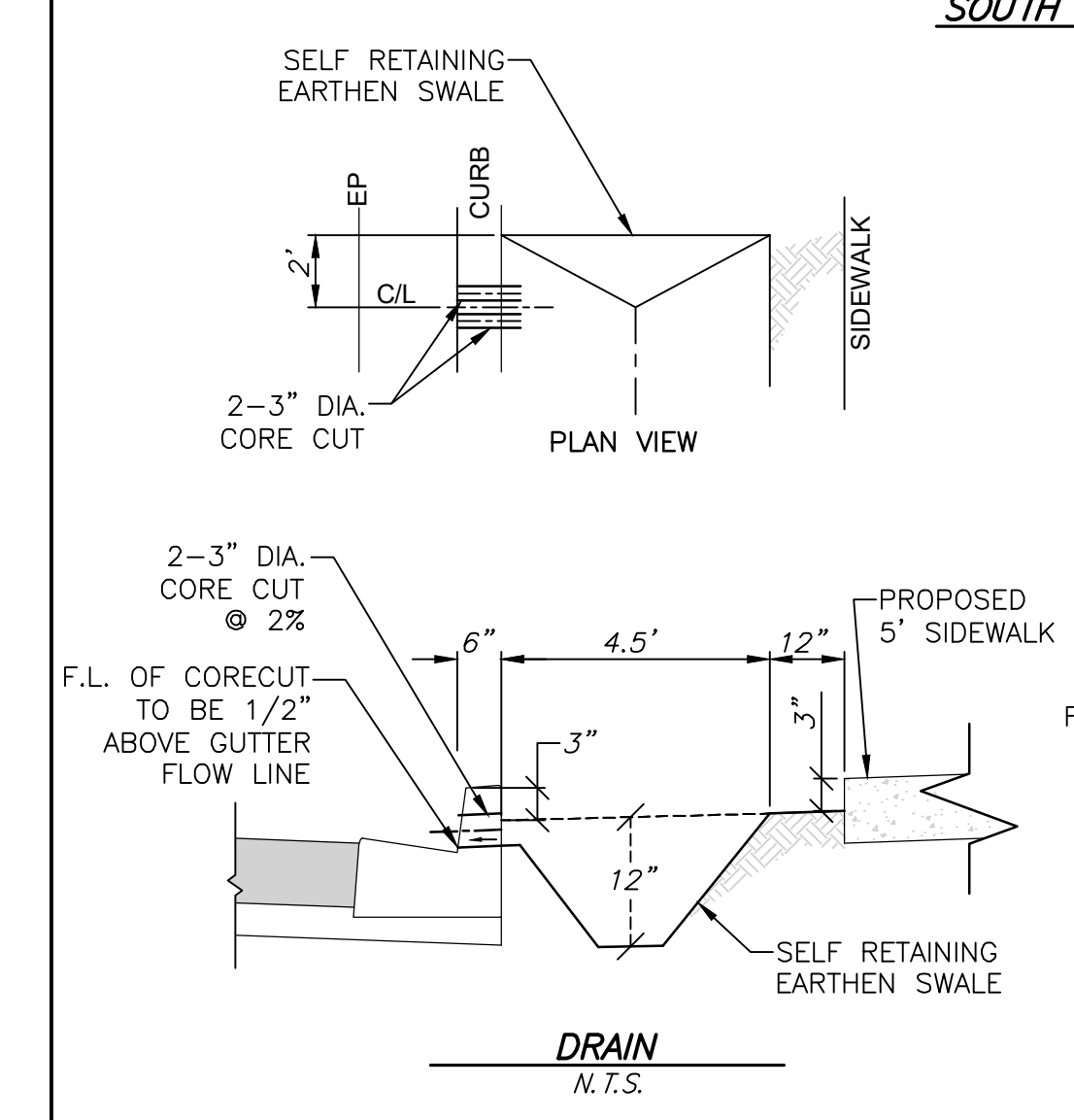
NOTE: SETBACKS TO COMPLY WITH LAMP  
**LEACH FIELD SEPARATION DETAIL**  
 N.T.S.  
**EXHIBIT "G"**  
 PREPARED: SEPTEMBER 27, 2022



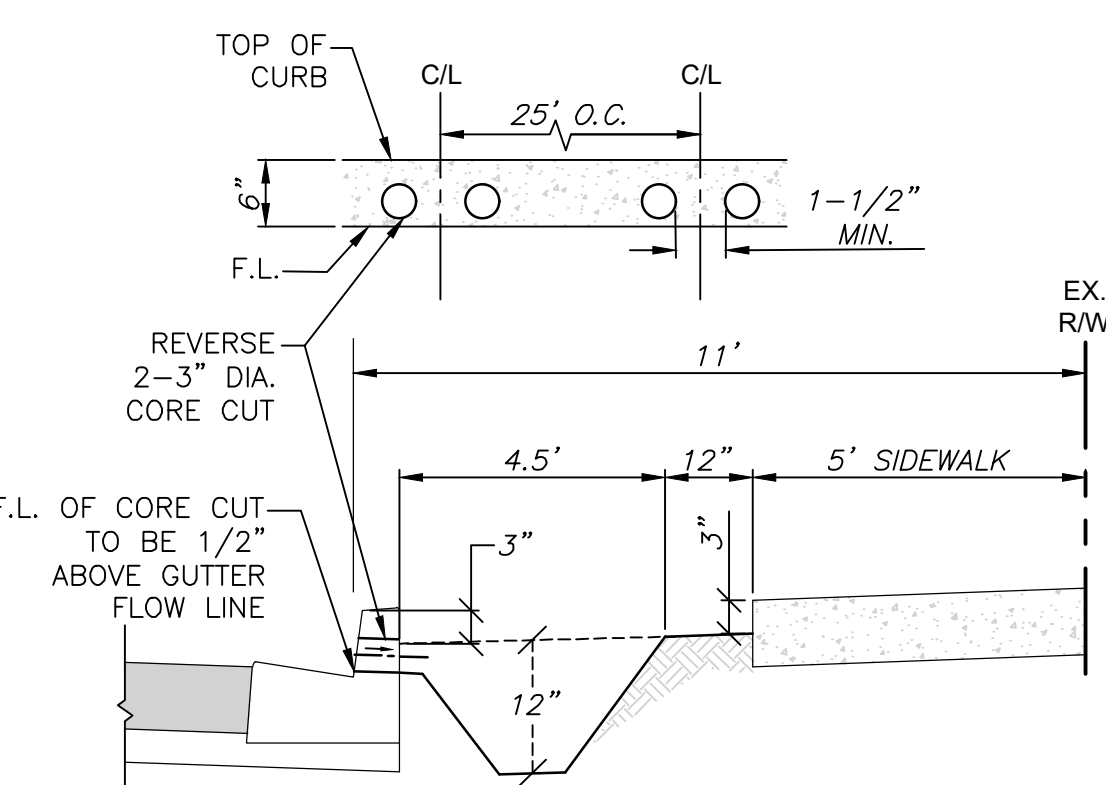
**SOUTH SIDEWALK DRAIN SECTION**  
N.T.S.



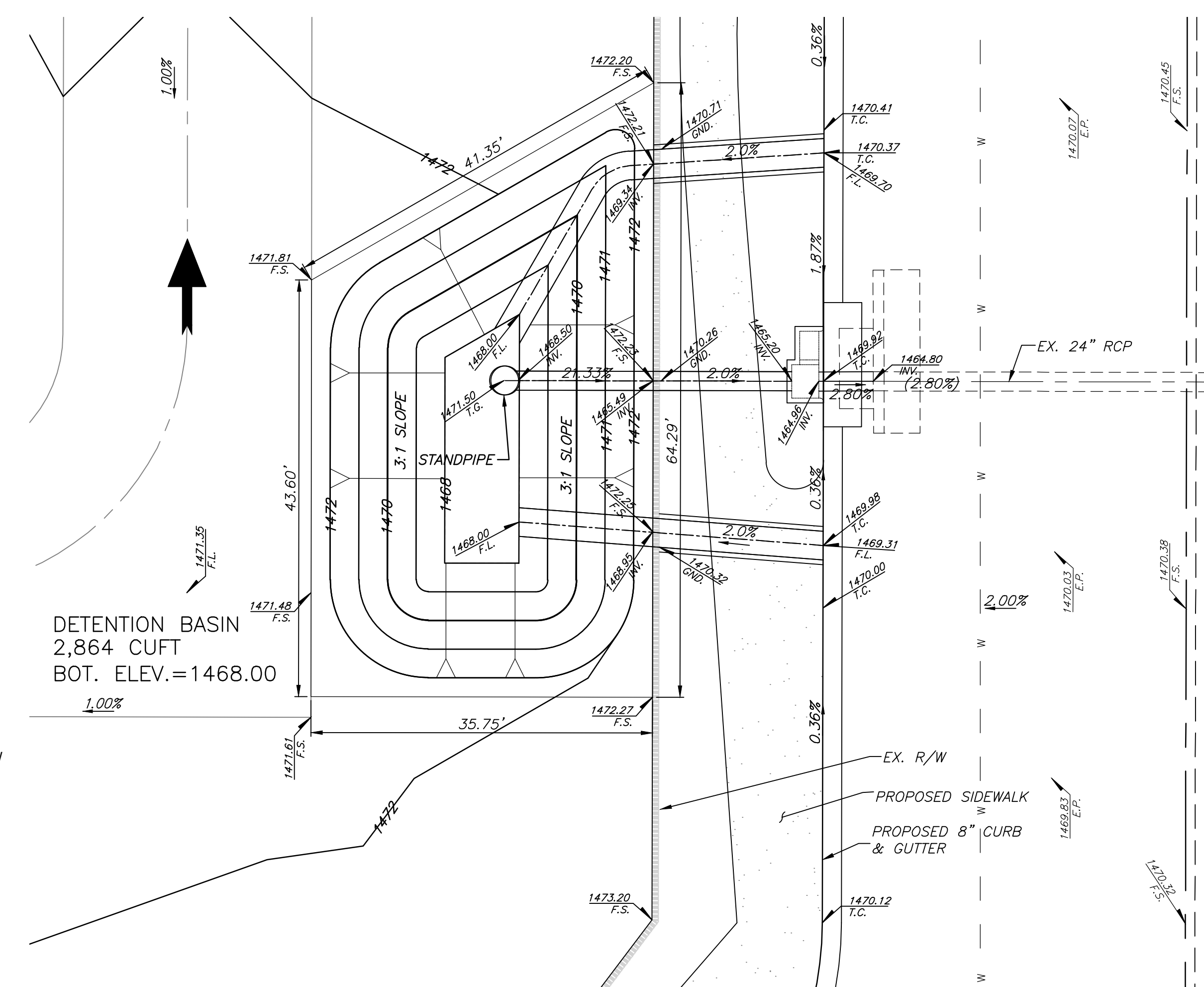
**NORTH SIDEWALK DRAIN SECTION**  
N.T.S.



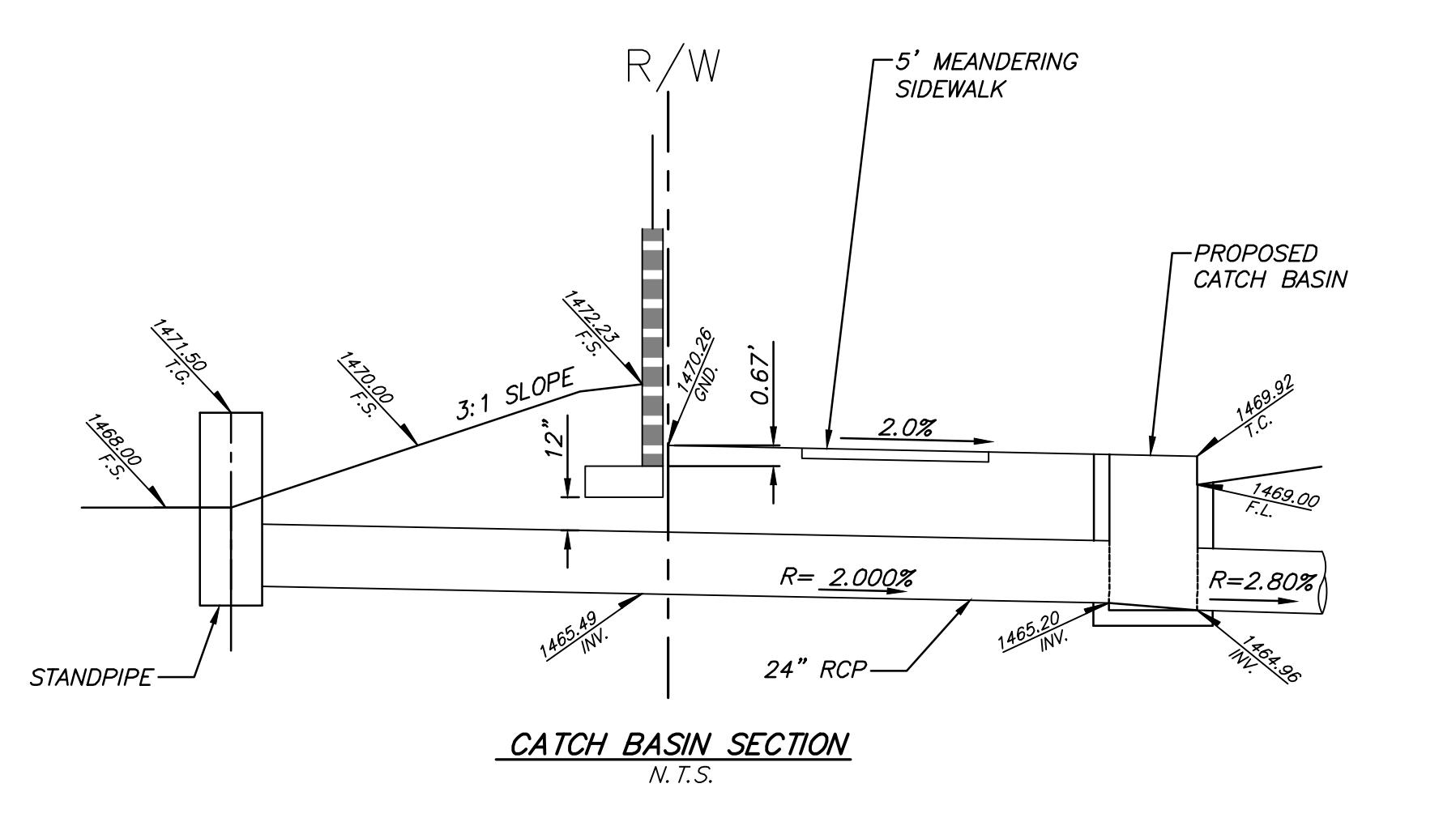
**DRAIN**  
N.T.S.



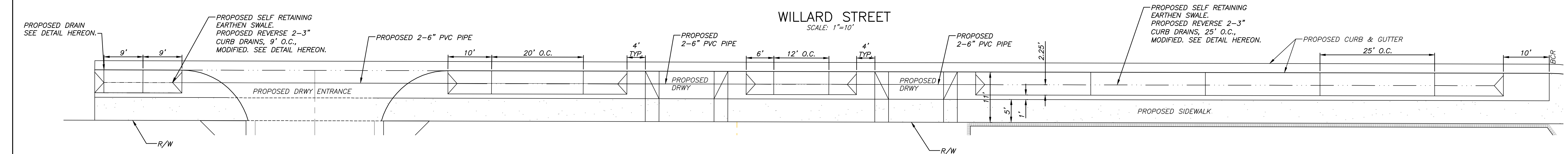
**VOLUME CALCULATION:**  
WILLARD STREET:  
(195x1.5)+(110'x2x0.7854)= 465 CU.FT.  
HADDOCK STREET:  
(263x1.5)= 394 CU.FT.  
**SELF RETAINING EARTHEN SWALE**  
(ALONG WILLARD RD. & HADDOCK ST.)  
N.T.S.



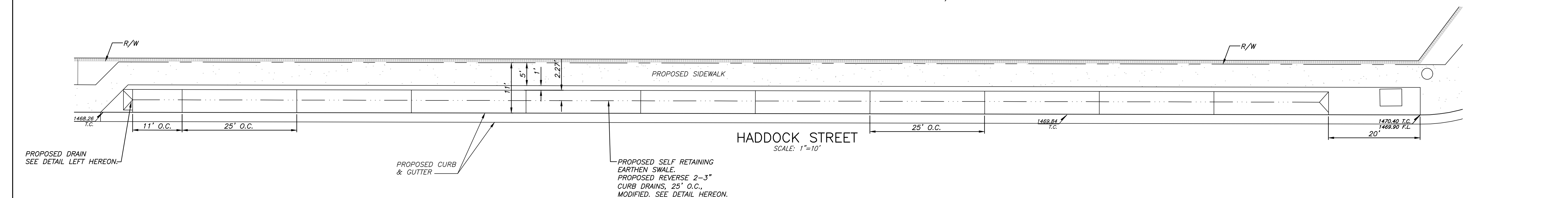
**DETENTION BASIN #3**  
(ALONG WINCHESTER ROAD)  
SCALE: 1"=10'



**CATCH BASIN SECTION**  
N.T.S.



**WILLARD STREET**  
SCALE: 1"=10'



**HADDOCK STREET**  
SCALE: 1"=10'

**EXHIBIT "G"**  
PREPARED: SEPTEMBER 27, 2022

***County Hydrology Manual Standard Tables &  
Flowmaster Analysis of Curb and Gutter Flow***

# RAINFALL INTENSITY—INCHES PER HOUR

**RCFC & WCD**  
 HYDROLOGY MANUAL

STANDARD  
 INTENSITY—DURATION  
 CURVES DATA

HEMET			HIGHGROVE			HOMELAND—WINCHESTER			IDYLLWILD			LAKEVIEW		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.40	5	3.02	4.37	5	2.91	4.37	5	4.91	7.28	5	2.77	4.16
6	2.58	4.00	6	2.75	3.97	6	2.65	3.97	6	4.47	6.62	6	2.53	3.79
7	2.37	3.68	7	2.54	3.67	7	2.44	3.67	7	4.13	6.11	7	2.34	3.51
8	2.21	3.43	8	2.37	3.42	8	2.28	3.42	8	3.85	5.70	8	2.19	3.29
9	2.08	3.23	9	2.23	3.22	9	2.15	3.22	9	3.62	5.36	9	2.07	3.10
10	1.96	3.05	10	2.11	3.05	10	2.03	3.05	10	3.43	5.08	10	1.96	2.94
11	1.87	2.90	11	2.01	2.90	11	1.93	2.90	11	3.26	4.83	11	1.87	2.80
12	1.78	2.77	12	1.92	2.77	12	1.85	2.77	12	3.12	4.62	12	1.79	2.68
13	1.71	2.65	13	1.84	2.66	13	1.77	2.66	13	2.99	4.43	13	1.72	2.58
14	1.64	2.55	14	1.77	2.56	14	1.71	2.56	14	2.88	4.26	14	1.66	2.48
15	1.58	2.46	15	1.71	2.47	15	1.64	2.47	15	2.78	4.11	15	1.60	2.40
16	1.53	2.38	16	1.65	2.39	16	1.59	2.39	16	2.68	3.98	16	1.55	2.32
17	1.48	2.30	17	1.60	2.31	17	1.54	2.31	17	2.60	3.85	17	1.50	2.25
18	1.44	2.23	18	1.55	2.24	18	1.50	2.24	18	2.52	3.74	18	1.46	2.19
19	1.40	2.17	19	1.51	2.18	19	1.45	2.18	19	2.45	3.64	19	1.42	2.13
20	1.36	2.11	20	1.47	2.12	20	1.42	2.12	20	2.39	3.54	20	1.39	2.08
22	1.29	2.01	22	1.40	2.02	22	1.35	2.02	22	2.27	3.37	22	1.32	1.98
24	1.24	1.92	24	1.34	1.93	24	1.29	1.93	24	2.17	3.22	24	1.26	1.90
26	1.18	1.84	26	1.28	1.85	26	1.24	1.85	26	2.09	3.09	26	1.22	1.82
28	1.14	1.77	28	1.23	1.78	28	1.19	1.78	28	2.01	2.97	28	1.17	1.76
30	1.10	1.70	30	1.19	1.72	30	1.15	1.72	30	1.94	2.87	30	1.13	1.70
32	1.06	1.65	32	1.15	1.66	32	1.11	1.66	32	1.87	2.77	32	1.10	1.64
34	1.03	1.59	34	1.12	1.61	34	1.07	1.61	34	1.81	2.69	34	1.06	1.59
36	1.00	1.55	36	1.08	1.57	36	1.04	1.57	36	1.76	2.61	36	1.03	1.55
38	.97	1.50	38	1.05	1.52	38	1.01	1.52	38	1.71	2.54	38	1.01	1.51
40	.94	1.46	40	1.02	1.48	40	.99	1.48	40	1.67	2.47	40	.98	1.47
45	.89	1.37	45	.96	1.39	45	.93	1.39	45	1.57	2.32	45	.92	1.39
50	.84	1.30	50	.91	1.32	50	.88	1.32	50	1.48	2.20	50	.88	1.31
55	.80	1.24	55	.87	1.26	55	.84	1.26	55	1.41	2.09	55	.84	1.25
60	.76	1.18	60	.83	1.20	60	.80	1.20	60	1.35	2.00	60	.80	1.20
65	.73	1.13	65	.80	1.15	65	.77	1.15	65	1.29	1.92	65	.77	1.15
70	.70	1.09	70	.77	1.11	70	.74	1.11	70	1.25	1.85	70	.74	1.11
75	.68	1.05	75	.74	1.07	75	.71	1.07	75	1.20	1.78	75	.72	1.07
80	.65	1.01	80	.71	1.03	80	.69	1.03	80	1.16	1.72	80	.69	1.04
85	.63	.98	85	.69	1.00	85	.67	1.00	85	1.13	1.67	85	.67	1.01

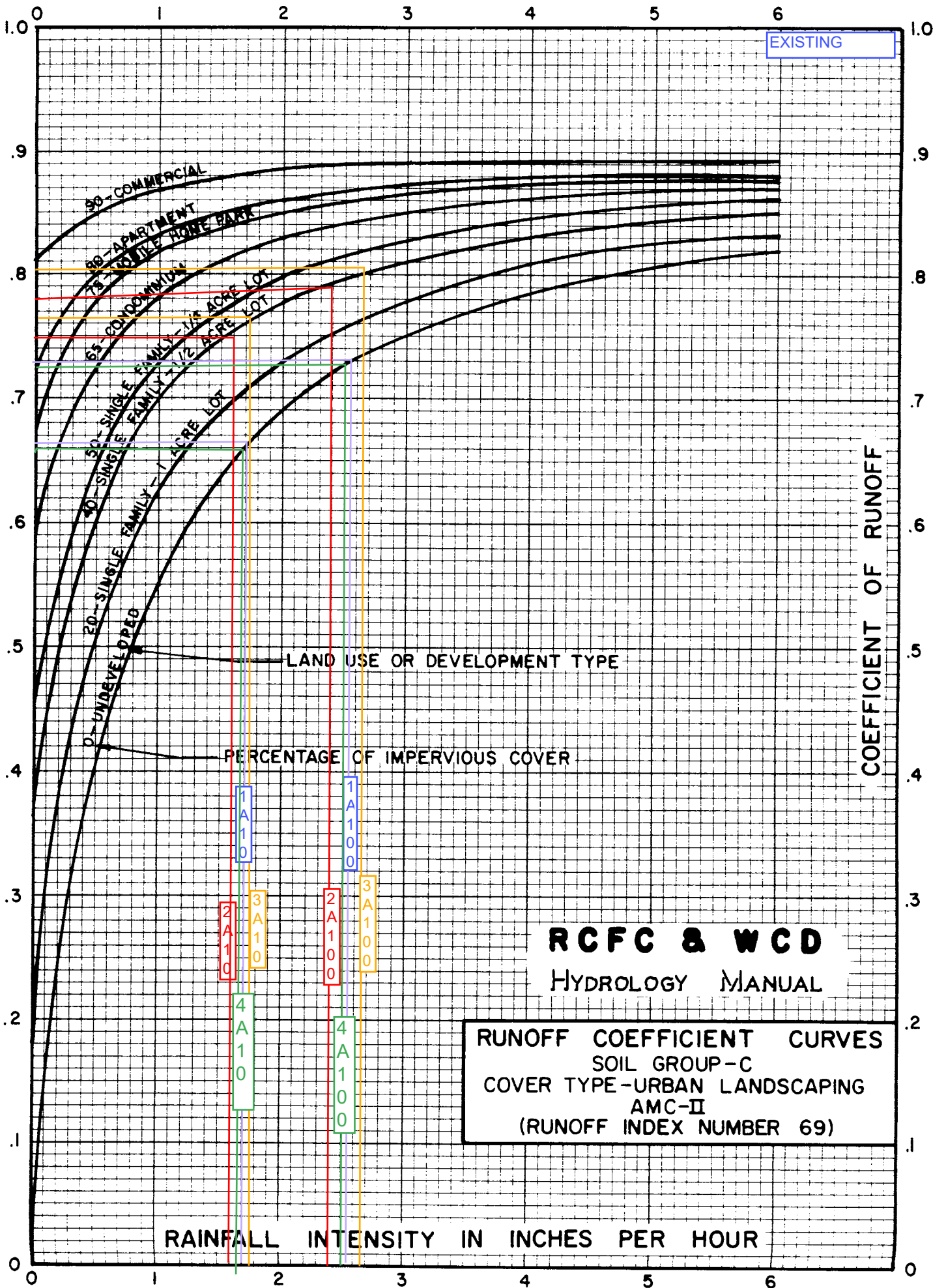
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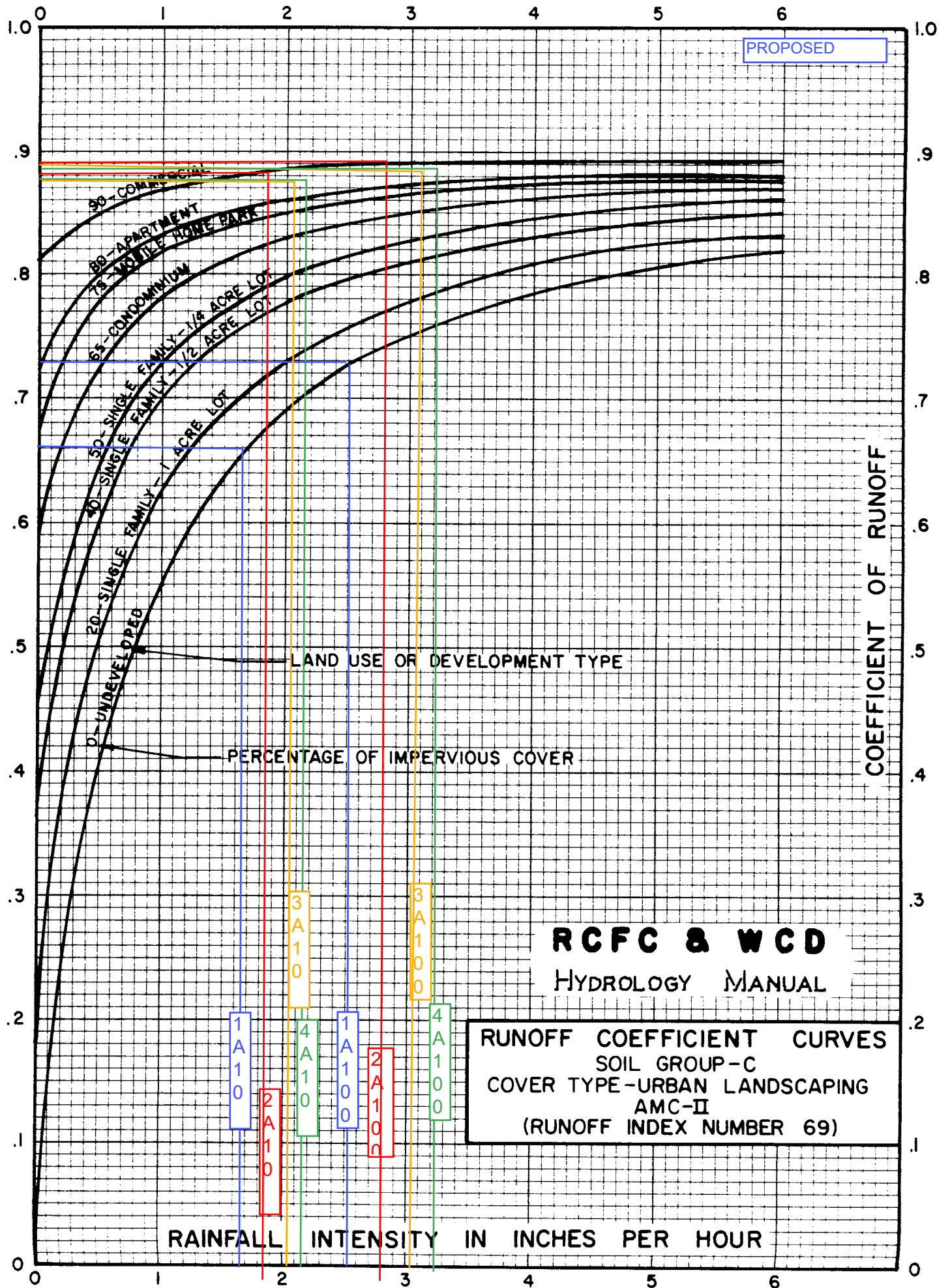
SLOPE = .520

SLOPE = .520

SLOPE = .520

SLOPE = .500







**winchester q10**  
**Worksheet for Irregular Channel**

<b>Project Description</b>	
Project File	c:\flowma~1\cross.fm2
Worksheet	50 Winchester
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

<b>Input Data</b>					
Channel Slope	0.003000 ft/ft				
Elevation range: -1.01 ft to 0.00 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.00	0.00	17.00	0.030	
17.00	-0.34	17.00	50.00	0.013	
17.00	-1.01				
19.00	-0.84				
50.00	-0.12				
Discharge	1.29	ft <sup>3</sup> /s			

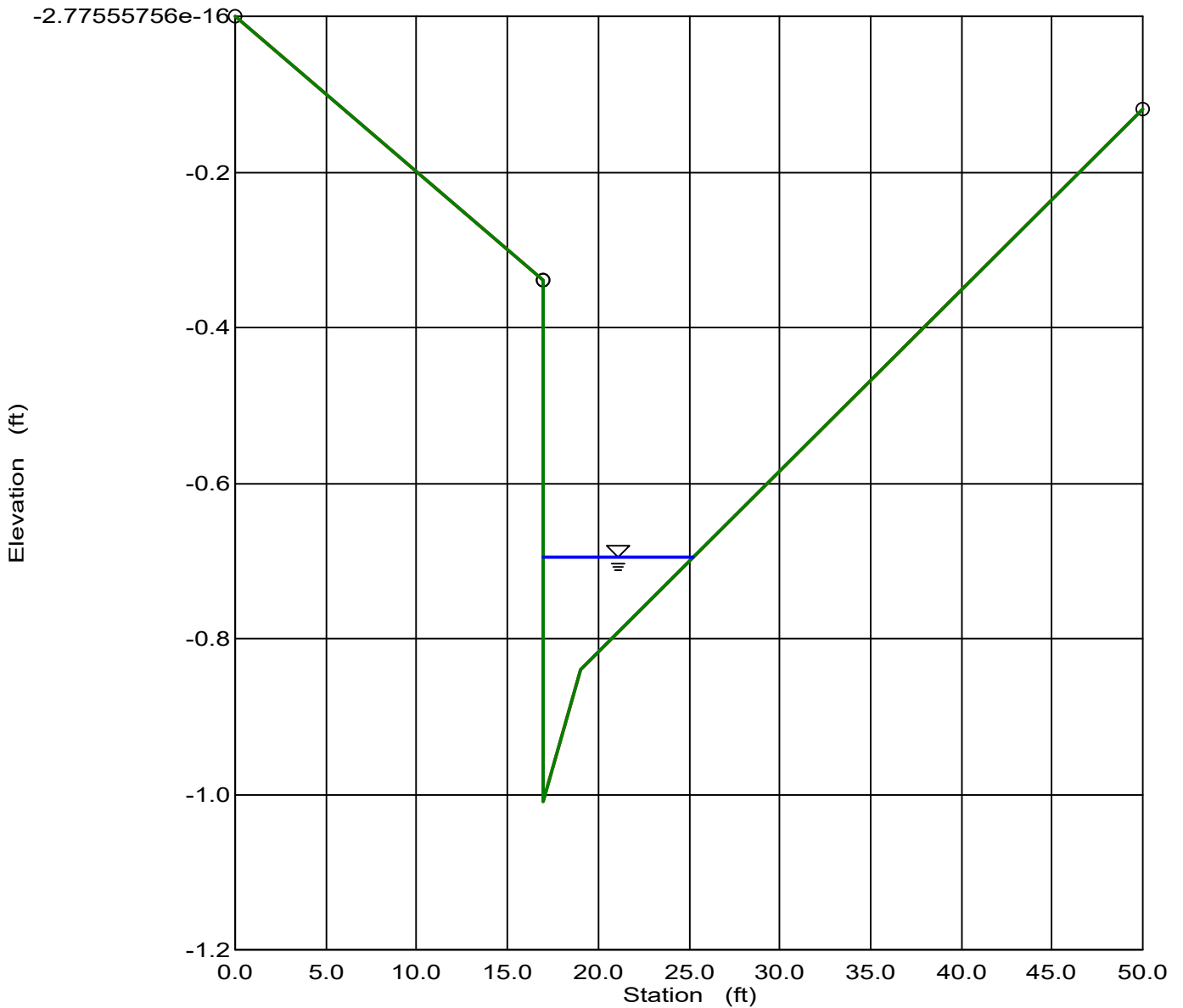
<b>Results</b>		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	-0.69	ft
Flow Area	0.92	ft <sup>2</sup>
Wetted Perimeter	8.58	ft
Top Width	8.26	ft
Depth	0.32	ft
Critical Water Elev.	-0.72	ft
Critical Slope	0.005595	ft/ft
Velocity	1.41	ft/s
Velocity Head	0.03	ft
Specific Energy	-0.66	ft
Froude Number	0.75	
Full Flow Capacity	67.94	ft <sup>3</sup> /s
Flow is subcritical.		

# WINCHESTER-Q10

## Cross Section for Irregular Channel

Project Description	
Project File	c:\flowma~1\cross.fm2
Worksheet	50 Winchester
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	0.003000 ft/ft
Water Surface Elevation	-0.69 ft
Discharge	1.29 ft <sup>3</sup> /s



**winchester q100**  
**Worksheet for Irregular Channel**

<b>Project Description</b>	
Project File	c:\flowma~1\cross.fm2
Worksheet	50 Winchester
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

<b>Input Data</b>					
Channel Slope	0.003000 ft/ft				
Elevation range: -1.01 ft to 0.00 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.00	0.00	17.00	0.030	
17.00	-0.34	17.00	50.00	0.013	
17.00	-1.01				
19.00	-0.84				
50.00	-0.12				
Discharge	1.97	ft <sup>3</sup> /s			

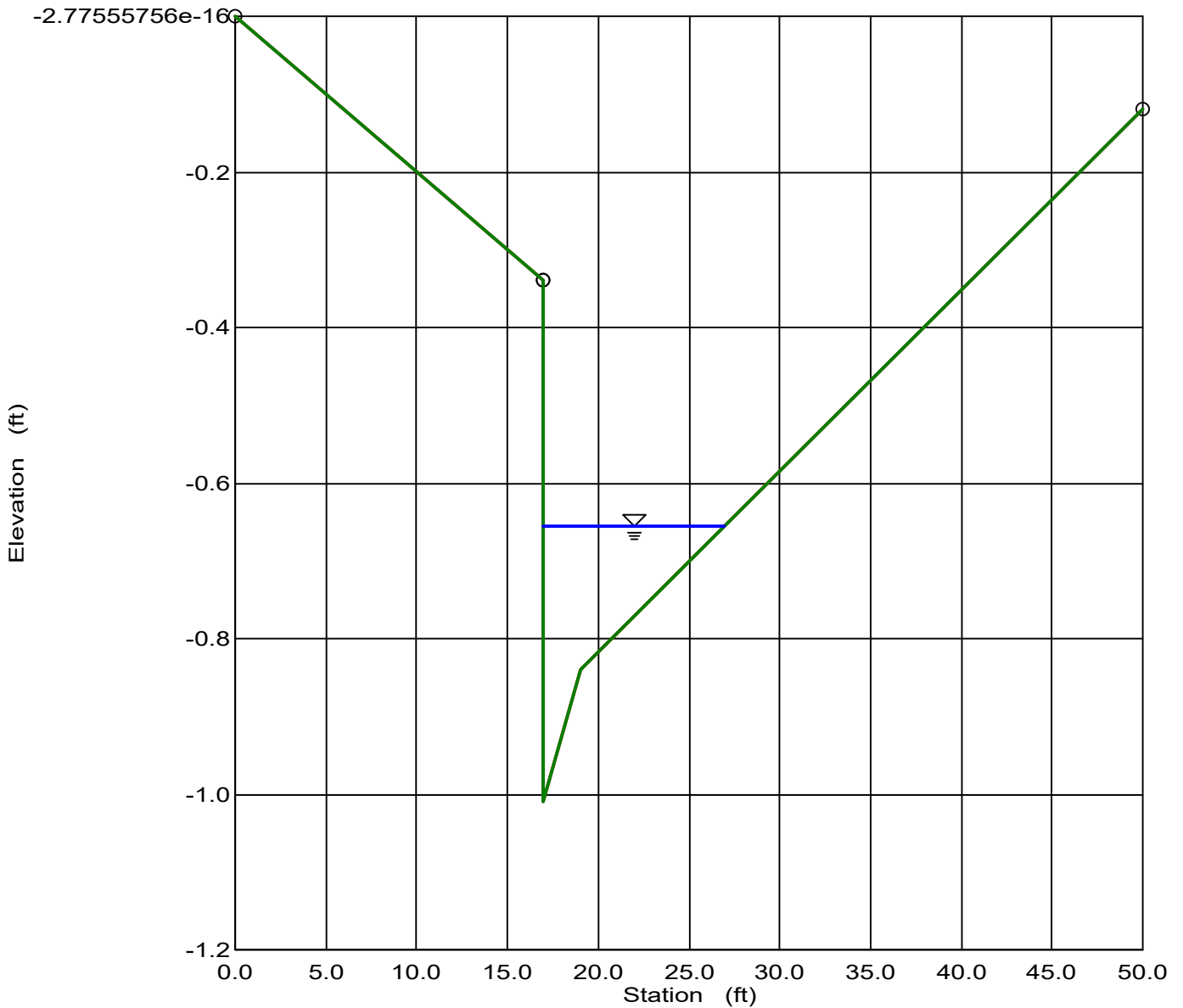
<b>Results</b>		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	-0.66	ft
Flow Area	1.27	ft <sup>2</sup>
Wetted Perimeter	10.30	ft
Top Width	9.94	ft
Depth	0.35	ft
Critical Water Elev.	-0.68	ft
Critical Slope	0.005309	ft/ft
Velocity	1.55	ft/s
Velocity Head	0.04	ft
Specific Energy	-0.62	ft
Froude Number	0.76	
Full Flow Capacity	67.94	ft <sup>3</sup> /s
Flow is subcritical.		

# WINCHESTER-Q100

## Cross Section for Irregular Channel

Project Description	
Project File	c:\flowma~1\cross.fm2
Worksheet	50 Winchester
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	0.003000 ft/ft
Water Surface Elevation	-0.66 ft
Discharge	1.97 ft <sup>3</sup> /s



**haddock q10**  
**Worksheet for Irregular Channel**

<b>Project Description</b>	
Project File	c:\flowma~1\cross.fm2
Worksheet	33ft haddock
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

<b>Input Data</b>				
Channel Slope	0.003000 ft/ft			
Elevation range: -0.72 ft to 0.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.00	0.00	11.00	0.030
11.00	-0.22	11.00	33.00	0.013
11.00	-0.72			
13.00	-0.55			
33.00	-0.15			
Discharge	0.51	ft <sup>3</sup> /s		

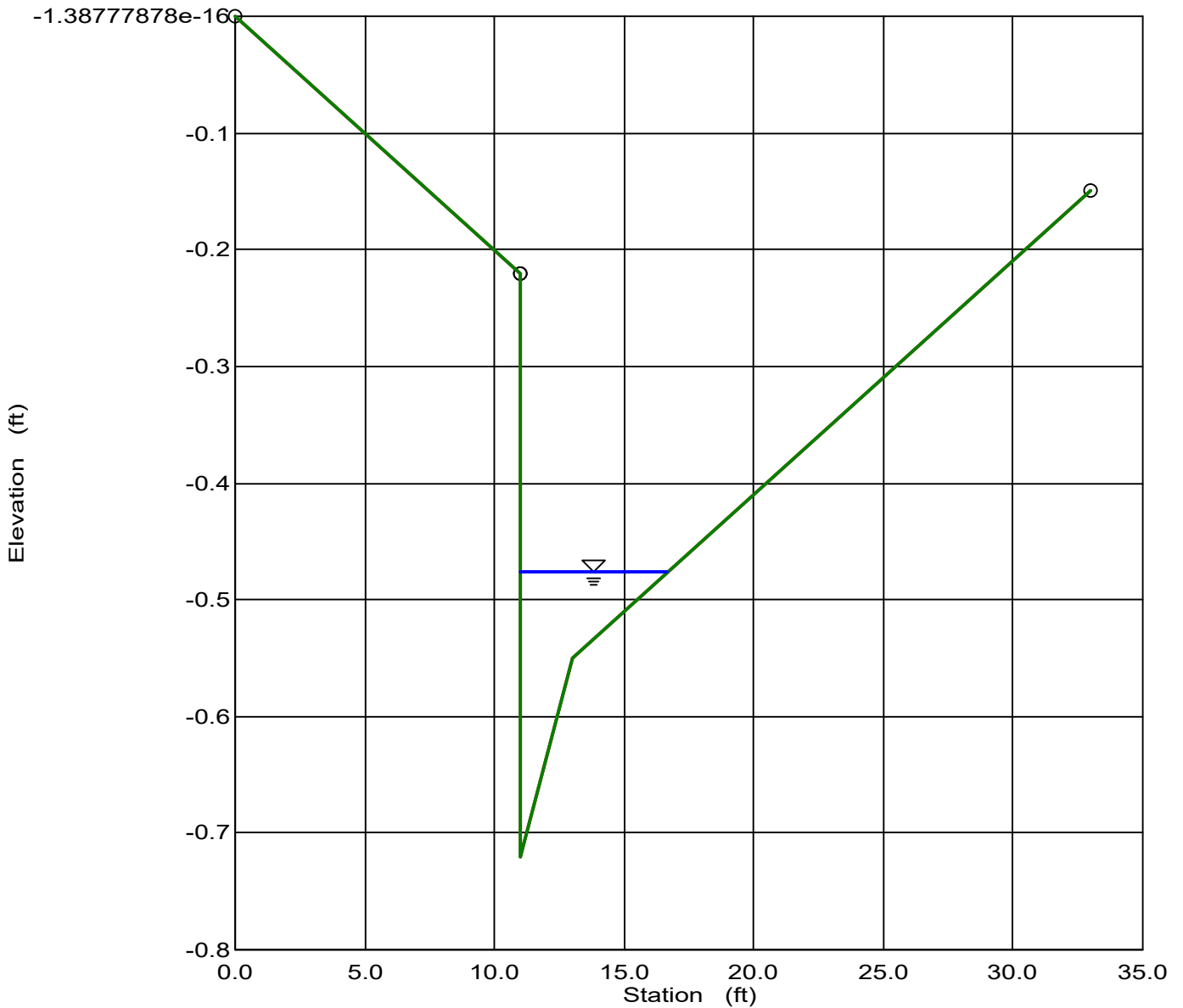
<b>Results</b>		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	-0.48	ft
Flow Area	0.45	ft <sup>2</sup>
Wetted Perimeter	5.93	ft
Top Width	5.68	ft
Depth	0.24	ft
Critical Water Elev.	-0.50	ft
Critical Slope	0.006272	ft/ft
Velocity	1.13	ft/s
Velocity Head	0.02	ft
Specific Energy	-0.46	ft
Froude Number	0.70	
Full Flow Capacity	27.19	ft <sup>3</sup> /s
Flow is subcritical.		

# HADDOCK-Q10

## Cross Section for Irregular Channel

Project Description	
Project File	c:\flowma~1\cross.fm2
Worksheet	33ft haddock
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	0.003000 ft/ft
Water Surface Elevation	-0.48 ft
Discharge	0.51 ft <sup>3</sup> /s



**haddock q100**  
**Worksheet for Irregular Channel**

<b>Project Description</b>	
Project File	c:\flowma~1\cross.fm2
Worksheet	33ft haddock
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

<b>Input Data</b>					
Channel Slope	0.003000 ft/ft				
Elevation range: -0.72 ft to 0.00 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.00	0.00	11.00	0.030	
11.00	-0.22	11.00	33.00	0.013	
11.00	-0.72				
13.00	-0.55				
33.00	-0.15				
Discharge	0.77	ft <sup>3</sup> /s			

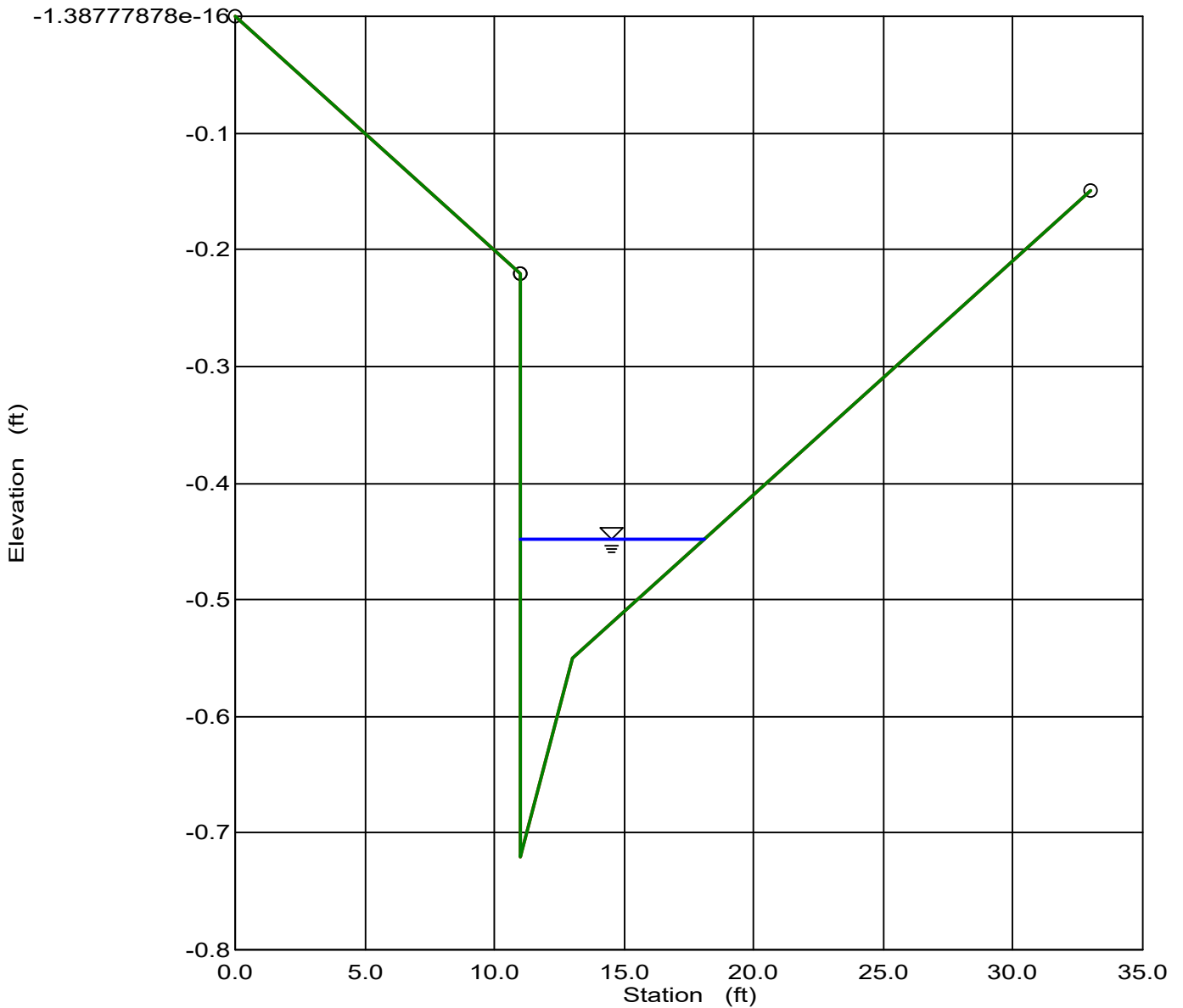
<b>Results</b>		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	-0.45	ft
Flow Area	0.63	ft <sup>2</sup>
Wetted Perimeter	7.37	ft
Top Width	7.09	ft
Depth	0.27	ft
Critical Water Elev.	-0.47	ft
Critical Slope	0.006023	ft/ft
Velocity	1.22	ft/s
Velocity Head	0.02	ft
Specific Energy	-0.43	ft
Froude Number	0.72	
Full Flow Capacity	27.19	ft <sup>3</sup> /s
Flow is subcritical.		

# HADDOCK-Q100

## Cross Section for Irregular Channel

Project Description	
Project File	c:\flowma~1\cross.fm2
Worksheet	33ft haddock
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	0.003000 ft/ft
Water Surface Elevation	-0.45 ft
Discharge	0.77 ft <sup>3</sup> /s





**Willard q10**  
**Worksheet for Irregular Channel**

<b>Project Description</b>	
Project File	c:\flowma~1\cross.fm2
Worksheet	35ft willard
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

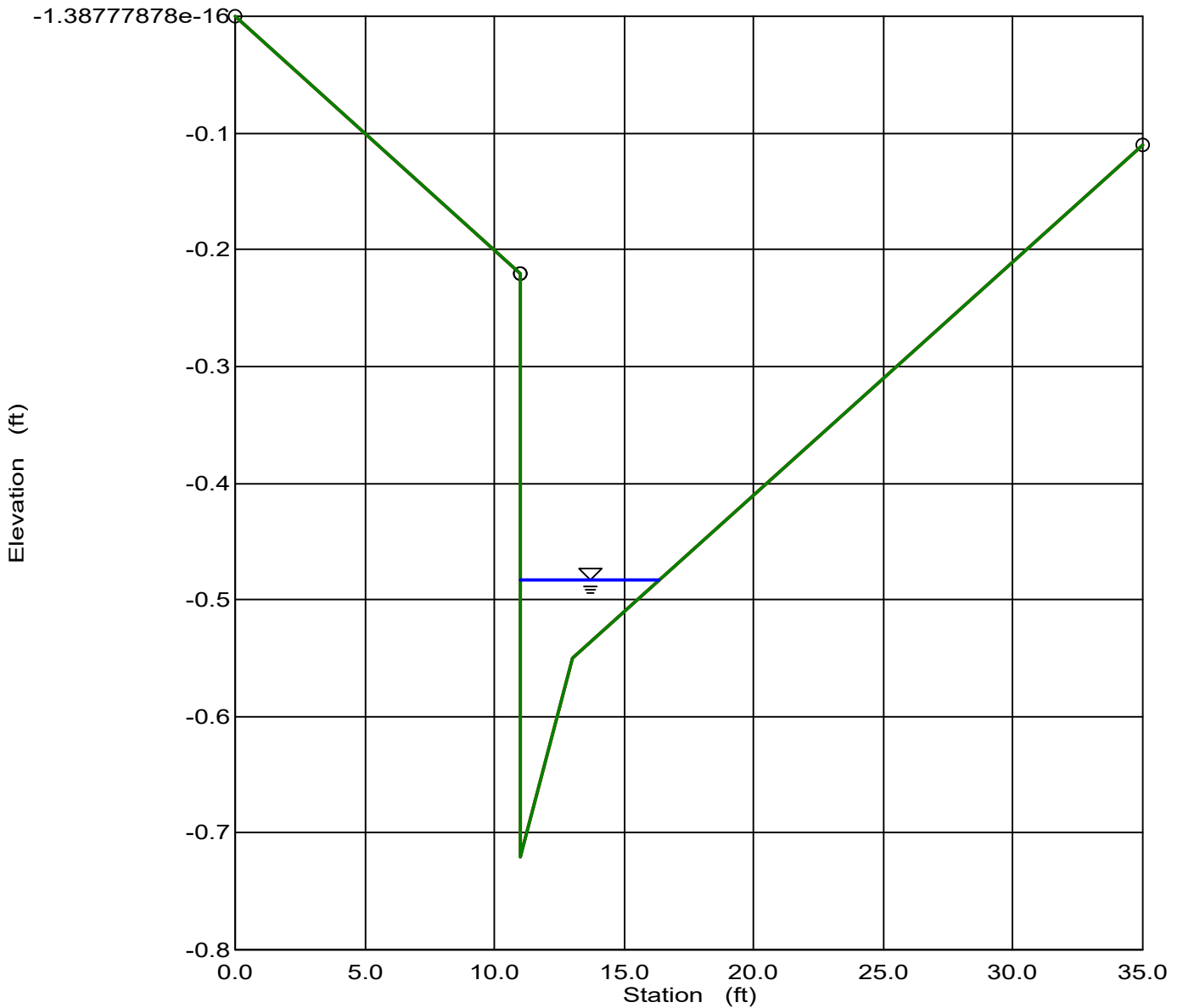
<b>Input Data</b>				
Channel Slope	0.003000 ft/ft			
Elevation range: -0.72 ft to 0.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.00	0.00	11.00	0.030
11.00	-0.22	11.00	35.00	0.013
11.00	-0.72			
13.00	-0.55			
35.00	-0.11			
Discharge	0.46	ft <sup>3</sup> /s		

<b>Results</b>		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	-0.48	ft
Flow Area	0.42	ft <sup>2</sup>
Wetted Perimeter	5.59	ft
Top Width	5.34	ft
Depth	0.24	ft
Critical Water Elev.	-0.51	ft
Critical Slope	0.006321	ft/ft
Velocity	1.11	ft/s
Velocity Head	0.02	ft
Specific Energy	-0.46	ft
Froude Number	0.70	
Full Flow Capacity	27.10	ft <sup>3</sup> /s
Flow is subcritical.		

**WILLARD-Q10**  
**Cross Section for Irregular Channel**

Project Description	
Project File	c:\flowma~1\cross.fm2
Worksheet	35ft willard
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	0.003000 ft/ft
Water Surface Elevation	-0.48 ft
Discharge	0.46 ft <sup>3</sup> /s



**Willard q100**  
**Worksheet for Irregular Channel**

<b>Project Description</b>	
Project File	c:\flowma~1\cross.fm2
Worksheet	35ft willard
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

<b>Input Data</b>					
Channel Slope	0.003000 ft/ft				
Elevation range: -0.72 ft to 0.00 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	0.00	0.00	11.00	0.030	
11.00	-0.22	11.00	35.00	0.013	
11.00	-0.72				
13.00	-0.55				
35.00	-0.11				
Discharge	0.71	ft <sup>3</sup> /s			

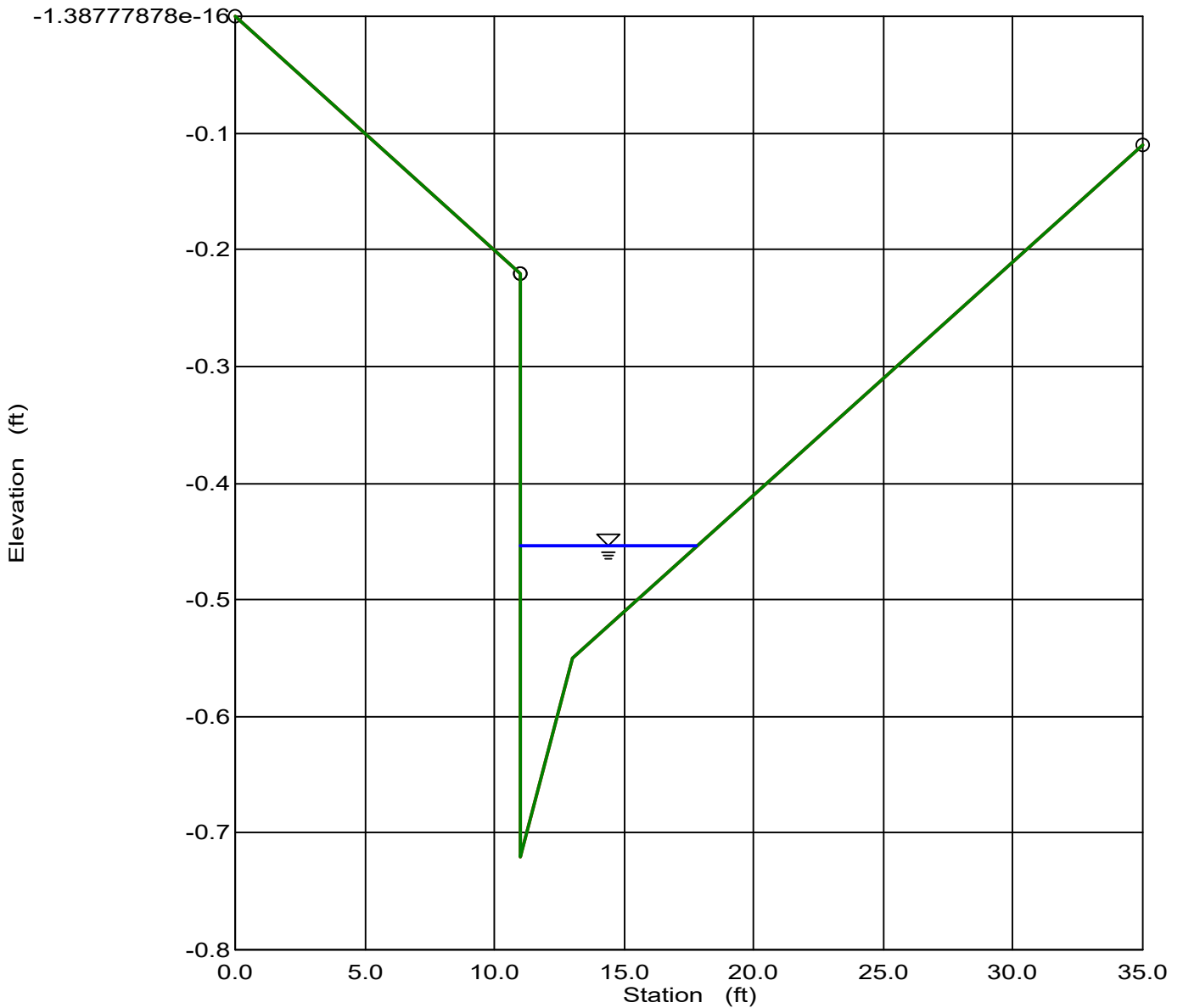
<b>Results</b>		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	-0.45	ft
Flow Area	0.59	ft <sup>2</sup>
Wetted Perimeter	7.07	ft
Top Width	6.80	ft
Depth	0.27	ft
Critical Water Elev.	-0.48	ft
Critical Slope	0.006074	ft/ft
Velocity	1.20	ft/s
Velocity Head	0.02	ft
Specific Energy	-0.43	ft
Froude Number	0.72	
Full Flow Capacity	27.10	ft <sup>3</sup> /s
Flow is subcritical.		

# WILLARD-Q100

## Cross Section for Irregular Channel

Project Description	
Project File	c:\flowma~1\cross.fm2
Worksheet	35ft willard
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	0.003000 ft/ft
Water Surface Elevation	-0.45 ft
Discharge	0.71 ft <sup>3</sup> /s



RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<u>URBAN COVERS -</u>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

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RUNOFF INDEX NUMBERS  
FOR  
PERVIOUS AREA

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

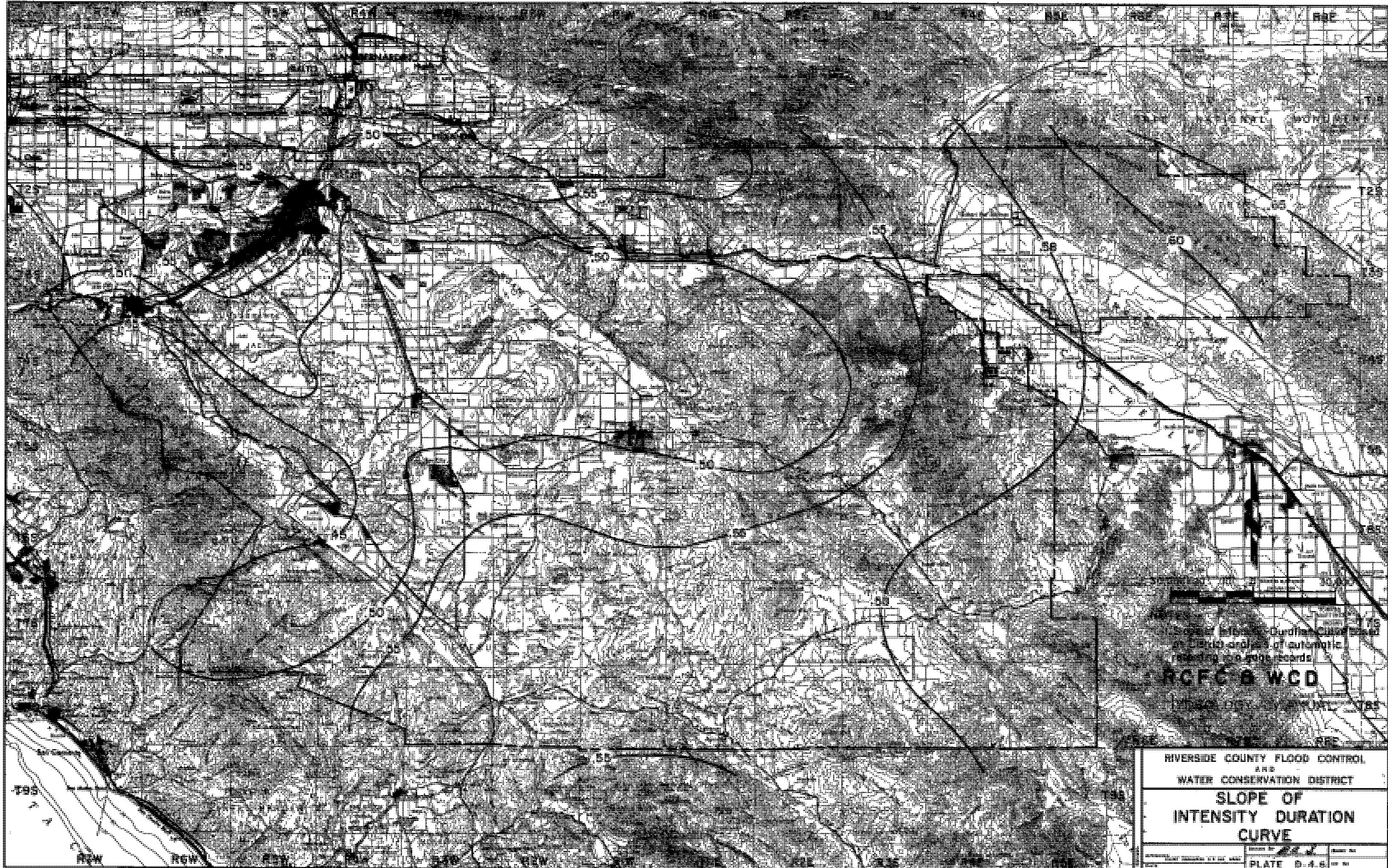
Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>AGRICULTURAL COVERS</u> (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)	See Note 4				
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard	See Note 4				

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:  
 Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.  
 Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.  
 Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Plate C-2 for a detailed description of cover types.
4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.
5. Reference Bibliography item 17.

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**RUNOFF INDEX NUMBERS  
 FOR  
 PERVIOUS AREA**



Map prepared by the District Engineer  
on the basis of data of automatic  
rainfall gauges and records.

**RCFC & WCD**

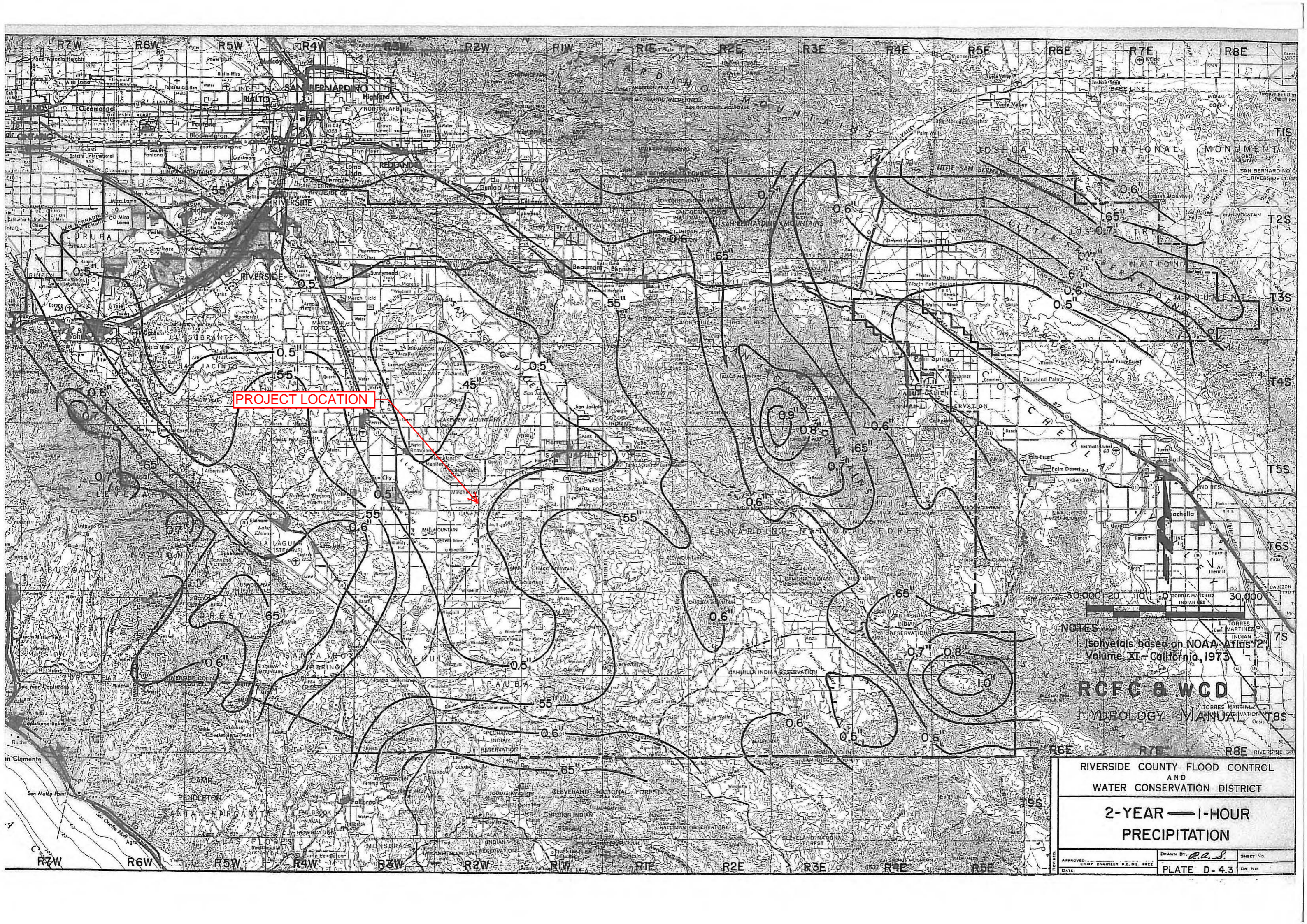
RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

**SLOPE OF  
INTENSITY DURATION  
CURVE**

PLATE D-1.1

***Isohyet Map 2 Year – 1 Hour***





**PROJECT LOCATION**

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

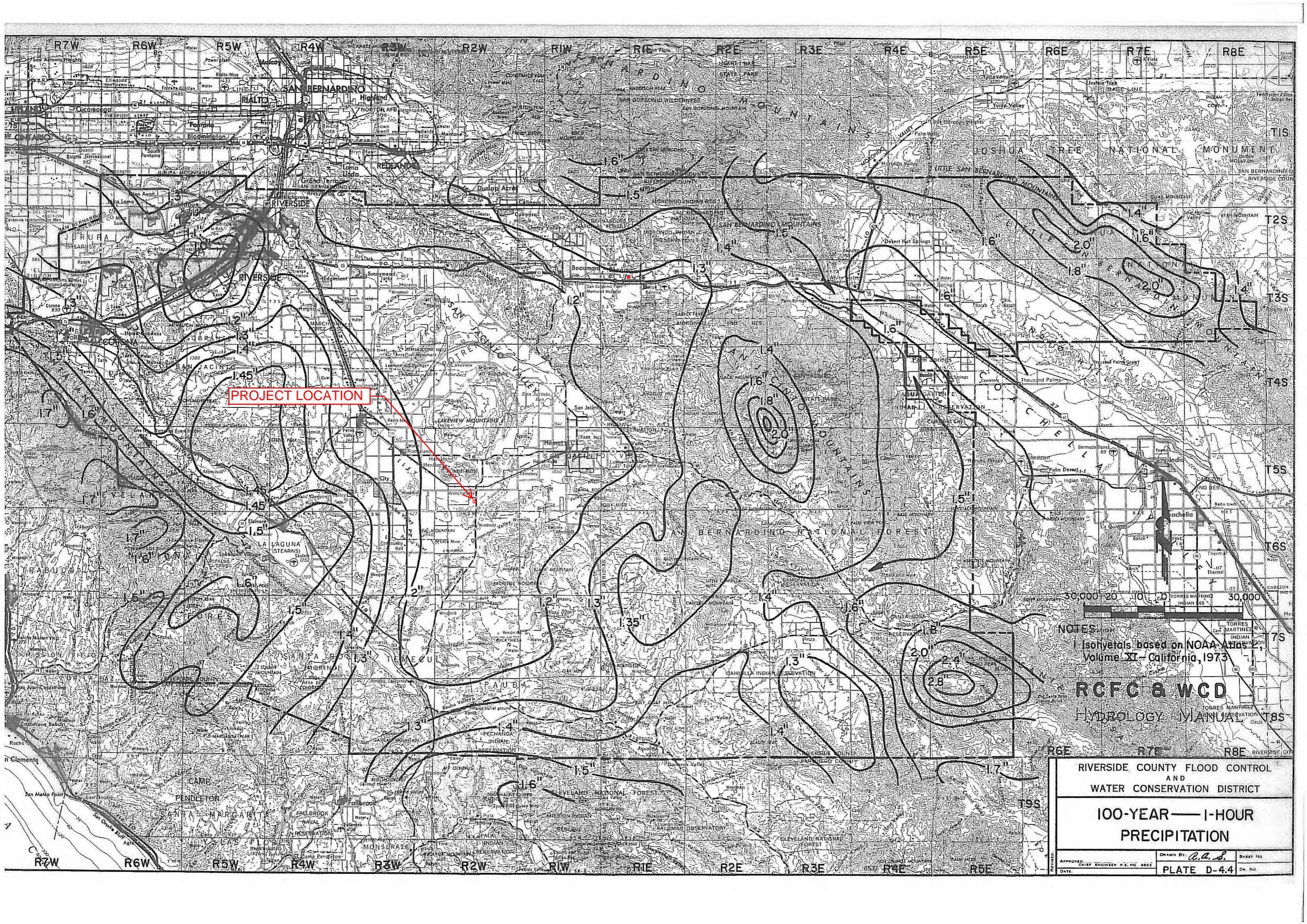
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HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

**2-YEAR — 1-HOUR  
PRECIPITATION**

APPROVED: CHIEF ENGINEER R.E. NO. 8822  
DATE: \_\_\_\_\_  
DRAWN BY: *R.L.S.*  
SHEET NO. \_\_\_\_\_  
PLATE D-43  
DA. NO. \_\_\_\_\_

***Isohyet Map 100 Year – 1 Hour***



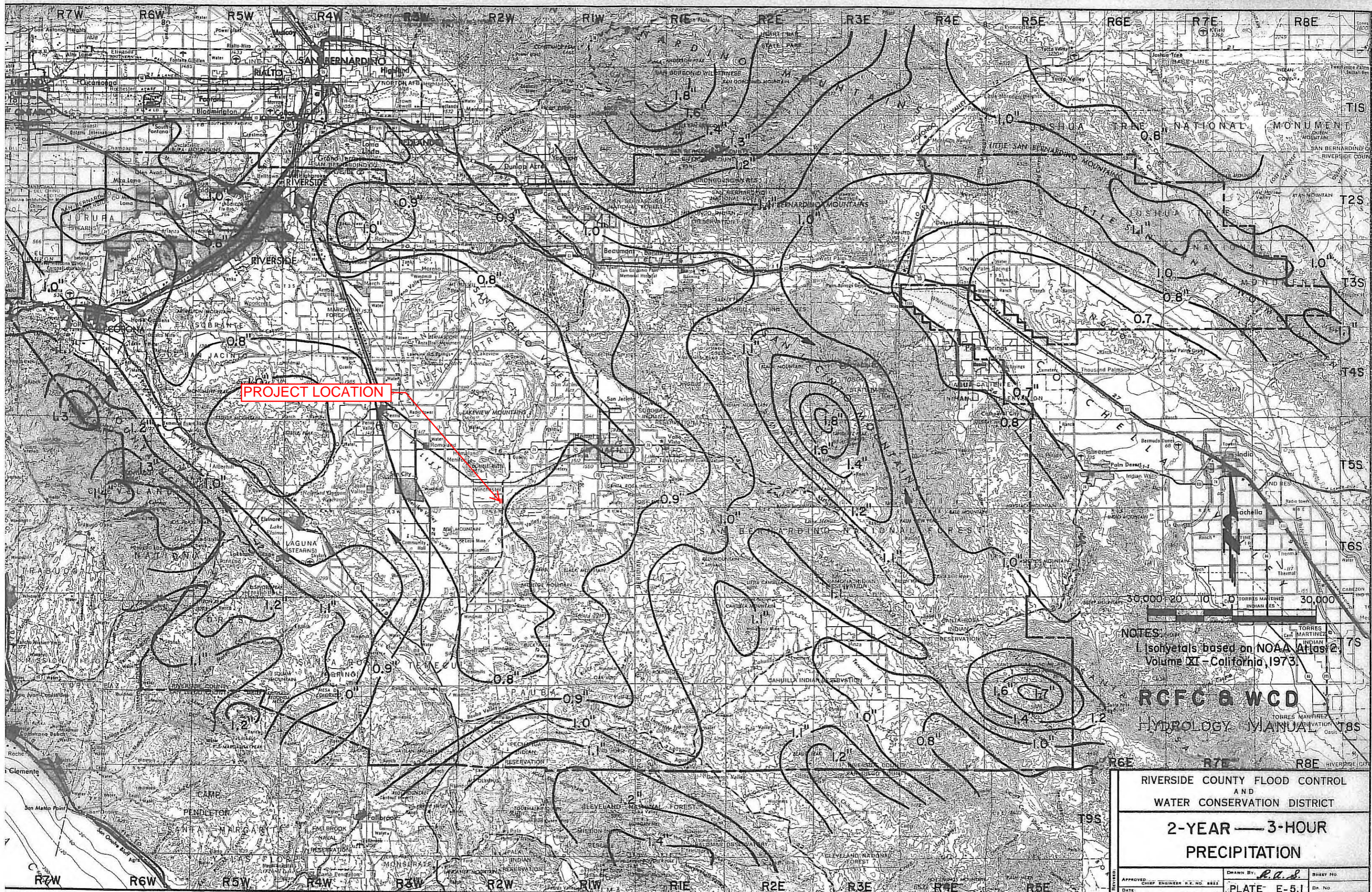
**PROJECT LOCATION**

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

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 HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
<b>100-YEAR — 1-HOUR PRECIPITATION</b>		
APPROVED CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: <i>C.A.S.</i>	SHEET NO.
DATE	PLATE D-4.4	DR. NO.

***Isohyet Map 2 Year – 3 Hour***



**PROJECT LOCATION**

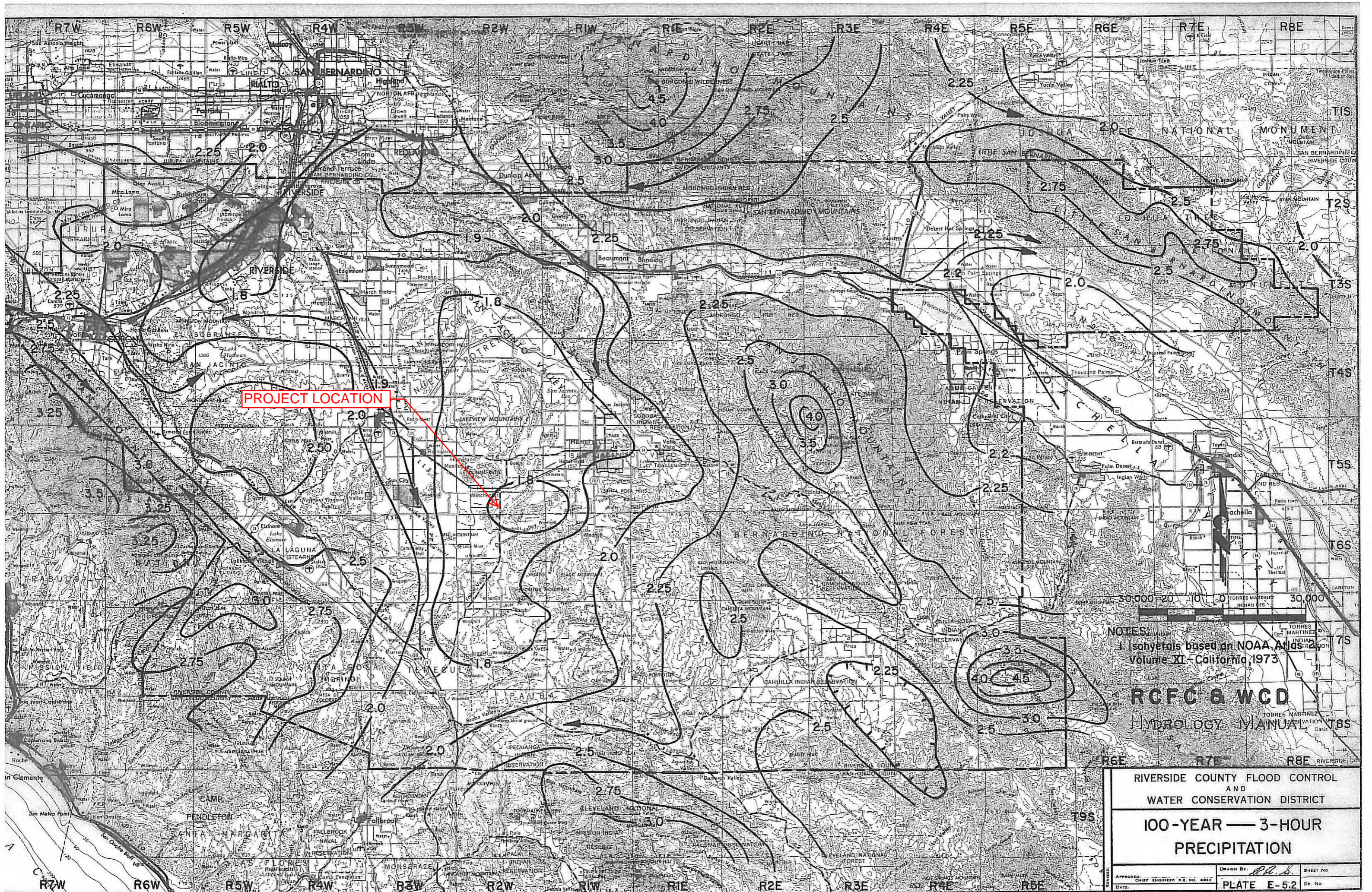
NOTES:  
 Isohyets based on NOAA Atlas 2,  
 Volume XI - California, 1973.

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 AND  
 WATER CONSERVATION DISTRICT  
**2-YEAR — 3-HOUR  
 PRECIPITATION**

APPROVED: _____ CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: <i>P.L.S.</i>	SHEET NO. _____
DATE: _____	PLATE E-5.1	DR. NO. _____

***Isohyet Map 100 Year – 3 Hour***



**PROJECT LOCATION**

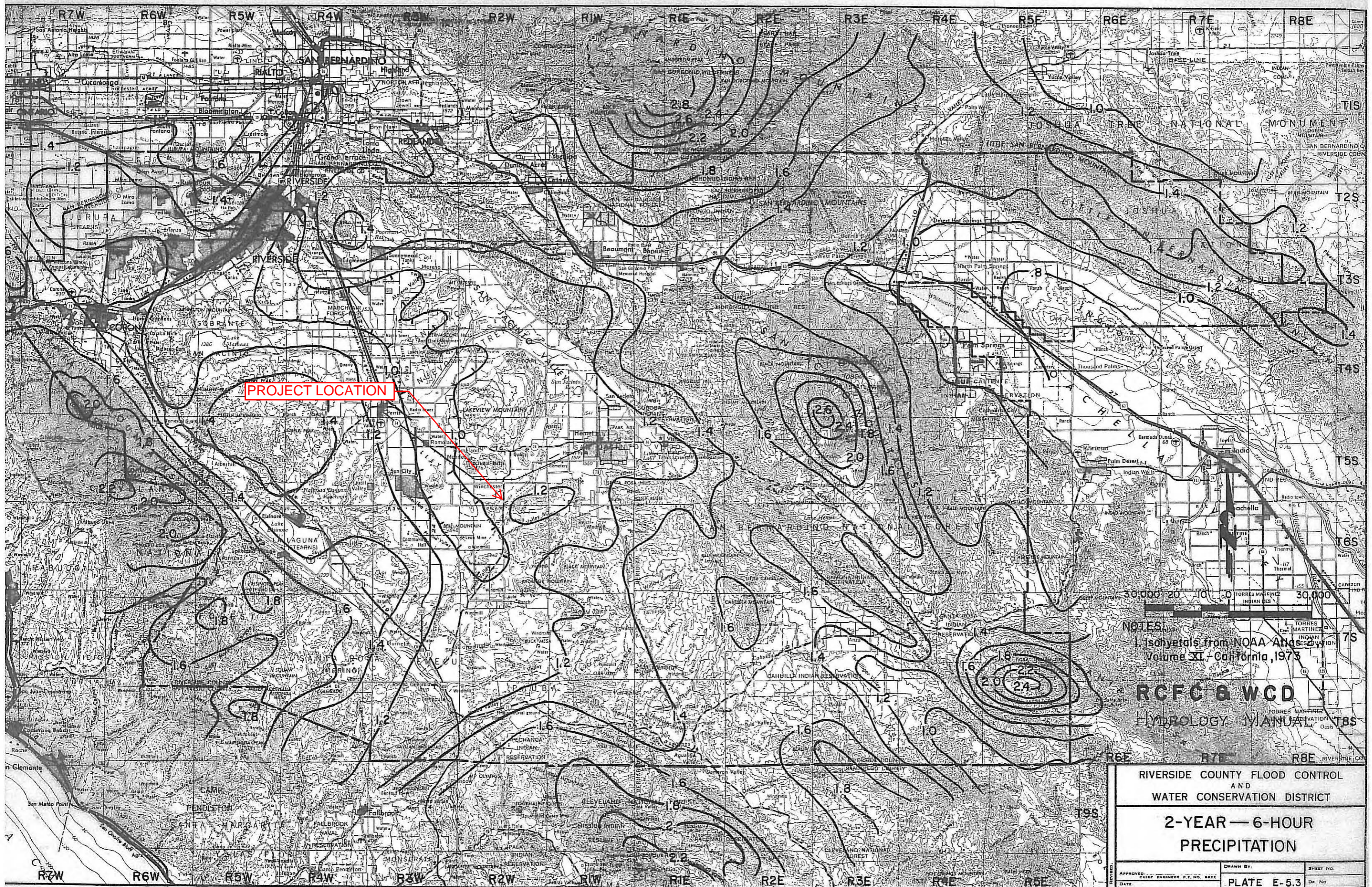
NOTES:  
 1. Isohyets based on NOAA Atlas 2, Volume XI - California, 1973

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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
100-YEAR — 3-HOUR PRECIPITATION		
APPROVED: _____	DRAWN BY: <i>RLB</i>	SHEET NO. _____
DATE: _____	PLATE E-5.2	DR. NO. _____

***Isohyet Map 2 Year – 6 Hour***





**PROJECT LOCATION**

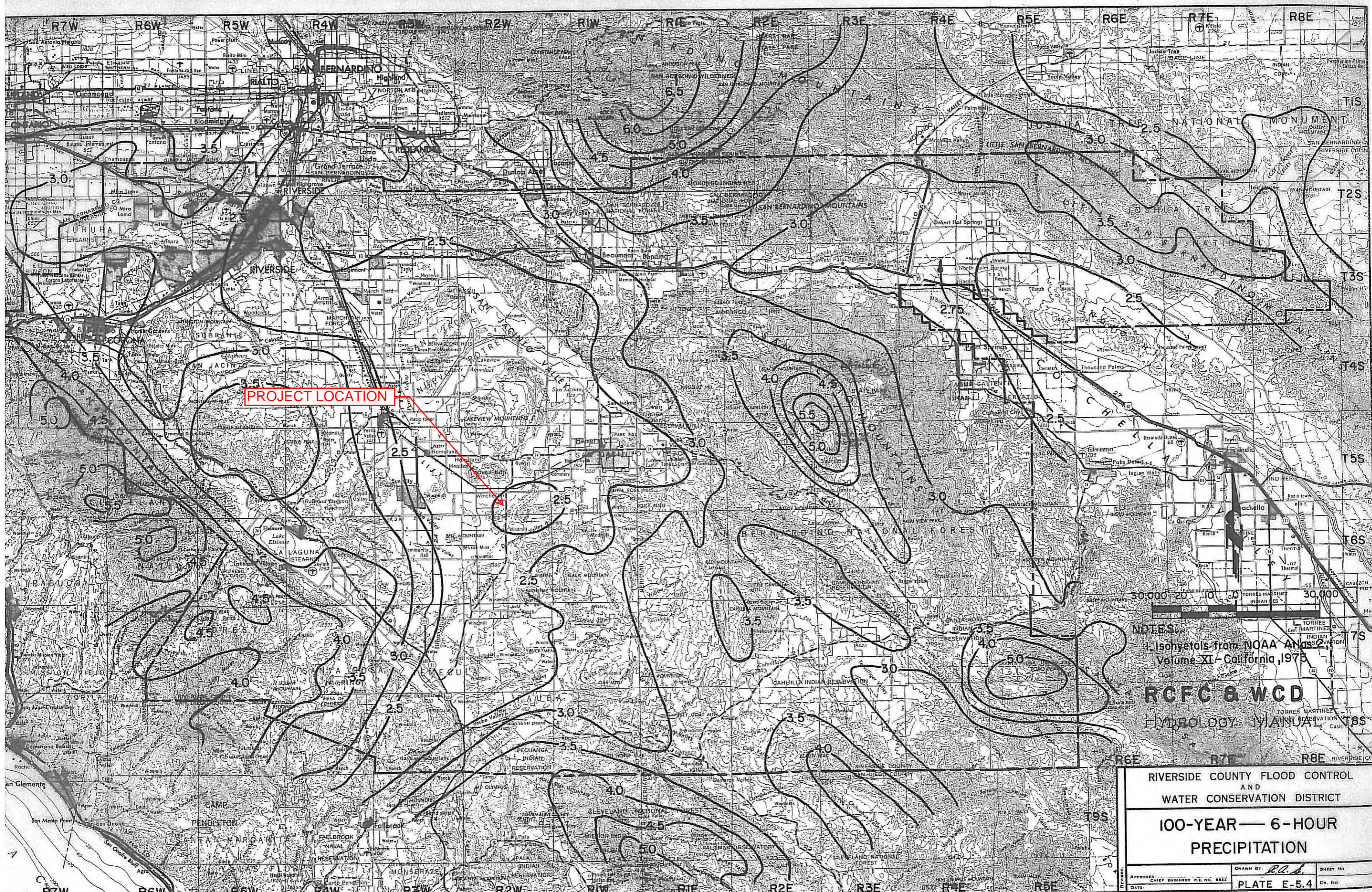
NOTES:  
 1. Isohyets from NOAA Atlas  
 Volume XI - California, 1973

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**RIVERSIDE COUNTY FLOOD CONTROL  
 AND  
 WATER CONSERVATION DISTRICT**  
**2-YEAR — 6-HOUR  
 PRECIPITATION**

APPROVED: _____ CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: _____	SHEET No. _____
DATE: _____	PLATE E-5.3	DA. No. _____

***Isohyet Map 100 Year – 6 Hour***



**PROJECT LOCATION**

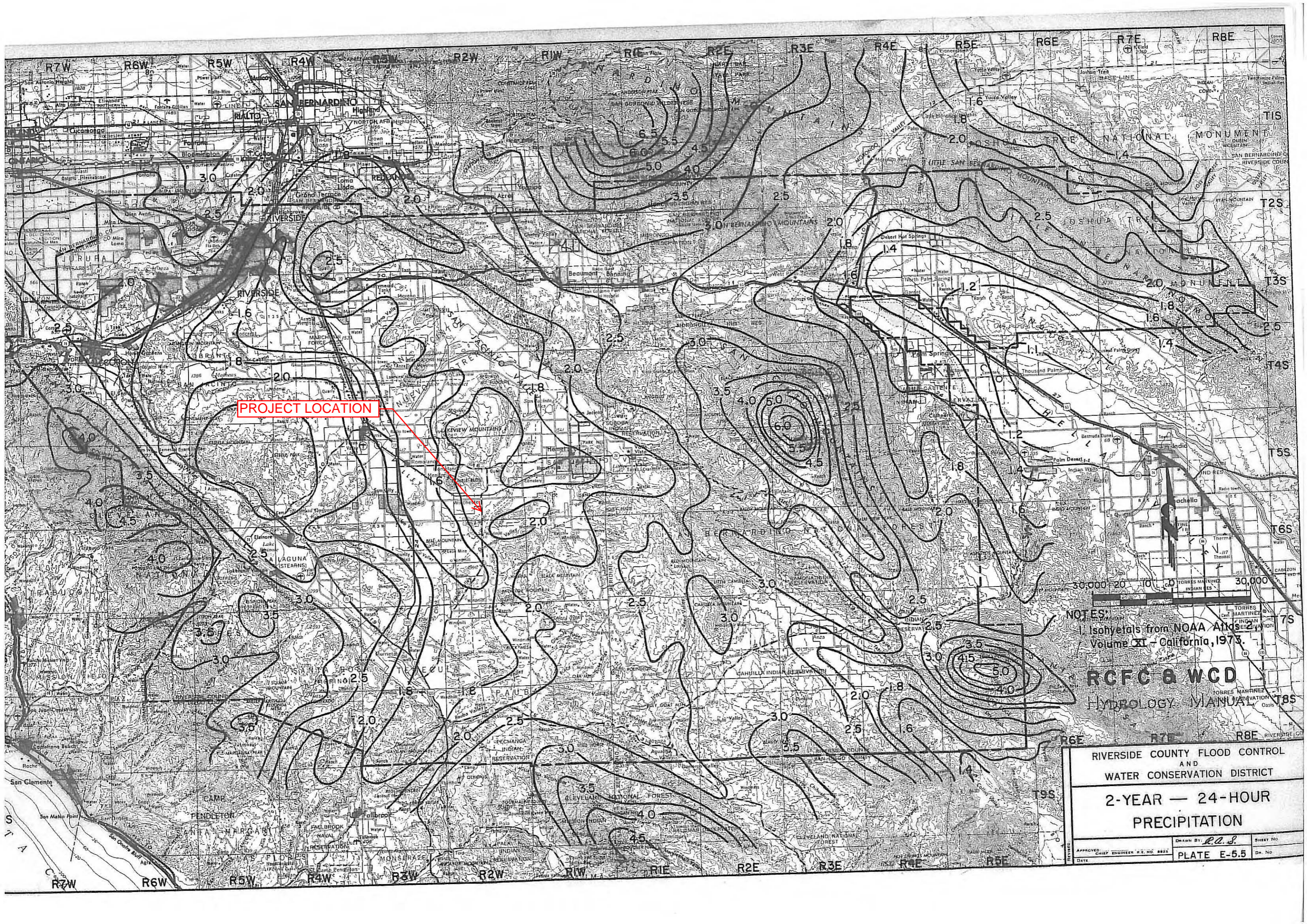
NOTES:  
 Isohyets from NOAA Atlas 2,  
 Volume XI - California, 1973

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RIVERSIDE COUNTY FLOOD CONTROL  
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 WATER CONSERVATION DISTRICT  
**100-YEAR — 6-HOUR  
 PRECIPITATION**

APPROVED	CHIEF ENGINEER W.E. NO. 8822	DRAWN BY	R.C.A.	SHEET NO.
DATE		PLATE	E-5.4	DR. NO.

***Isohyet Map 2 Year – 24 Hour***



**PROJECT LOCATION**

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

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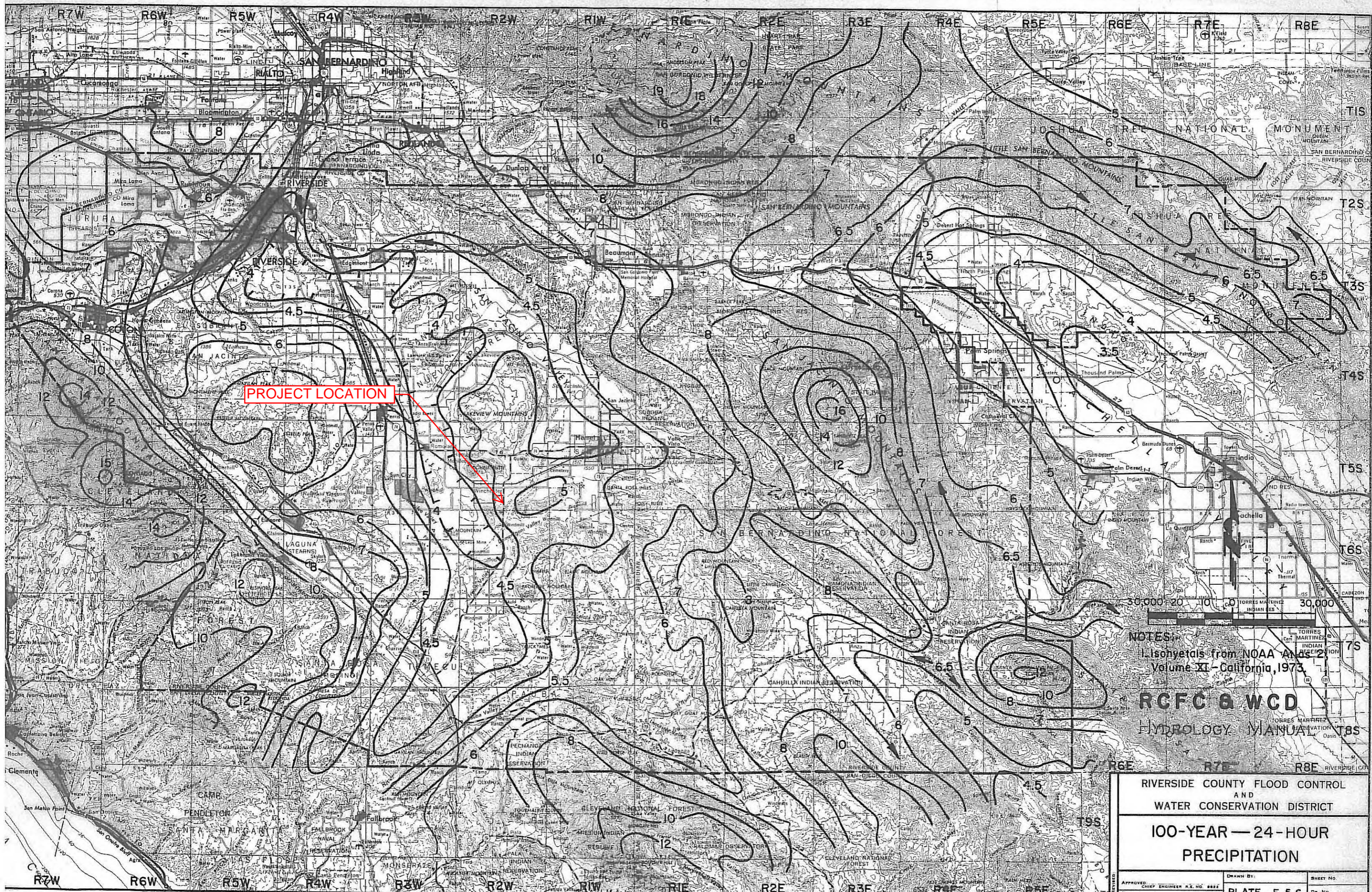
RIVERSIDE COUNTY FLOOD CONTROL  
 AND  
 WATER CONSERVATION DISTRICT

**2-YEAR — 24-HOUR  
 PRECIPITATION**

APPROVED: \_\_\_\_\_ CHIEF ENGINEER R.E. NO. 8822  
 DATE \_\_\_\_\_

DRAWN BY: *P.L.S.* SHEET NO. \_\_\_\_\_  
 PLATE E-5.5 Dn. No. \_\_\_\_\_

***Isohyet Map 100 Year – 24 Hour***



**PROJECT LOCATION**

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

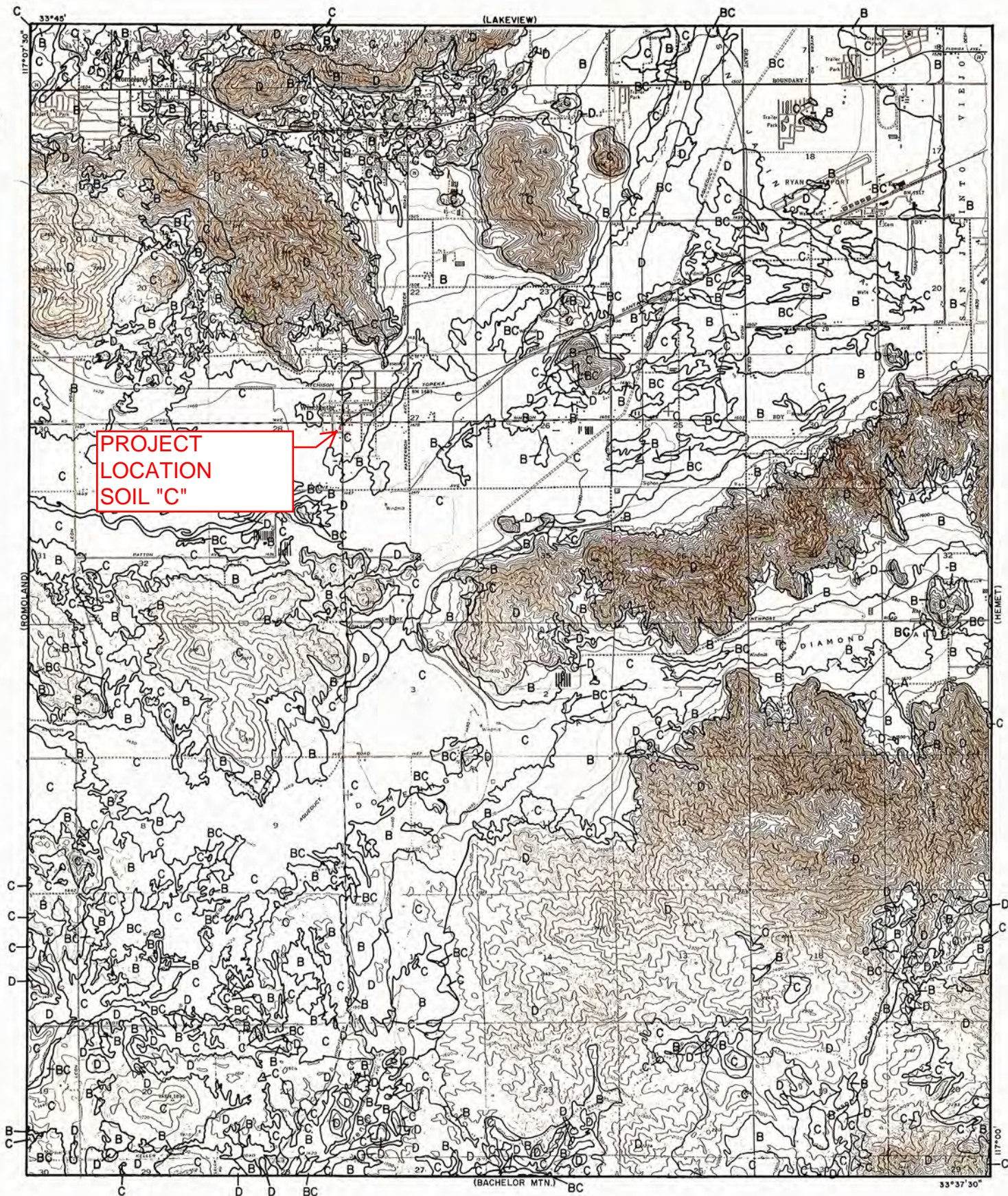
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 HYDROLOGY MANUAL

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.

## ***Soils Map***





PROJECT  
LOCATION  
SOIL "C"

**LEGEND**

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

**RCFC & WCD**  
HYDROLOGY MANUAL

0 FEET 5000

**HYDROLOGIC SOILS GROUP MAP  
FOR  
WINCHESTER**

**APPENDIX 2: HYDROMODIFICATION CALCULATION**

***Existing Runoff***  
***2 Year Storm Event***

## 2-year calcs

Prepared by HDG, INC.

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Page 1

### Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
<b>3.540</b>	91	Fallow, bare soil, HSG C (1S)
3.540	91	<b>TOTAL AREA</b>

## 2-year calcs

Prepared by HDG, INC.

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Page 2

### Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
<b>3.540</b>	HSG C	1S
0.000	HSG D	
0.000	Other	
3.540		<b>TOTAL AREA</b>

**2-year calcs**

Prepared by HDG, INC.

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Type I 24-hr 2 Rainfall=3.20"

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Page 3

Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: 1A**

Runoff Area=3.540 ac 0.00% Impervious Runoff Depth>2.23"

Flow Length=610' Slope=0.0066 '/' Tc=40.9 min CN=91/0 Runoff=2.34 cfs 0.658 af

**Reach 4R: (new Reach)**

Inflow=2.34 cfs 0.658 af

Outflow=2.34 cfs 0.658 af

**Total Runoff Area = 3.540 ac Runoff Volume = 0.658 af Average Runoff Depth = 2.23"**  
**100.00% Pervious = 3.540 ac 0.00% Impervious = 0.000 ac**

**2-year calcs**

Prepared by HDG, INC.

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Type I 24-hr 2 Rainfall=3.20"

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Page 4

**Summary for Subcatchment 1S: 1A**

Runoff = 2.34 cfs @ 10.11 hrs, Volume= 0.658 af, Depth> 2.23"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs  
Type I 24-hr 2 Rainfall=3.20"

Area (ac)	CN	Description
3.540	91	Fallow, bare soil, HSG C
3.540	91	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	300	0.0066	0.25		<b>Sheet Flow, 1A-1</b> Fallow n= 0.050 P2= 1.90"
19.8	300	0.0066	0.25		<b>Sheet Flow, 1A-2</b> Fallow n= 0.050 P2= 1.90"
1.3	10	0.0066	0.13		<b>Sheet Flow, 1A-2</b> Fallow n= 0.050 P2= 1.90"
40.9	610	Total			

**2-year calcs**

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**Hydrograph for Subcatchment 1S: 1A**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	<b>0.00</b>	0.00
0.10	0.01	0.00	0.00	0.00
0.20	0.01	0.00	0.00	0.00
0.30	0.02	0.00	0.00	0.00
0.40	0.02	0.00	0.00	0.00
0.50	0.03	0.00	0.00	0.00
0.60	0.03	0.00	0.00	0.00
0.70	0.04	0.00	0.00	0.00
0.80	0.04	0.00	0.00	0.00
0.90	0.05	0.00	0.00	0.00
1.00	0.06	0.00	0.00	0.00
1.10	0.06	0.00	0.00	0.00
1.20	0.07	0.00	0.00	0.00
1.30	0.07	0.00	0.00	0.00
1.40	0.08	0.00	0.00	0.00
1.50	0.08	0.00	0.00	0.00
1.60	0.09	0.00	0.00	0.00
1.70	0.10	0.00	0.00	0.00
1.80	0.10	0.00	0.00	0.00
1.90	0.11	0.00	0.00	0.00
2.00	0.11	0.00	0.00	0.00
2.10	0.12	0.00	0.00	0.00
2.20	0.12	0.00	0.00	0.00
2.30	0.13	0.00	0.00	0.00
2.40	0.14	0.00	0.00	0.00
2.50	0.14	0.00	0.00	0.00
2.60	0.15	0.00	0.00	0.00
2.70	0.15	0.00	0.00	0.00
2.80	0.16	0.00	0.00	0.00
2.90	0.17	0.00	0.00	0.00
3.00	0.17	0.00	0.00	0.00
3.10	0.18	0.00	0.00	0.00
3.20	0.19	0.00	0.00	0.00
3.30	0.19	0.00	0.00	0.00
3.40	0.20	0.00	0.00	0.00
3.50	0.21	0.00	0.00	0.00
3.60	0.21	0.00	0.00	0.00
3.70	0.22	0.00	0.00	0.00
3.80	0.23	0.00	0.00	0.00
3.90	0.24	0.00	0.00	0.00
4.00	0.24	0.00	0.00	0.01
4.10	0.25	0.00	0.00	0.01
4.20	0.26	0.00	0.00	0.01
4.30	0.27	0.00	0.00	0.01
4.40	0.27	0.01	0.00	0.02
4.50	0.28	0.01	0.00	0.02
4.60	0.29	0.01	0.00	0.02
4.70	0.30	0.01	0.00	0.03
4.80	0.30	0.01	0.00	0.03
4.90	0.31	0.01	0.00	0.03
5.00	0.32	0.01	0.00	0.03
5.10	0.33	0.02	0.00	0.04
5.20	0.34	0.02	0.00	0.04



**2-year calcs**

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**Hydrograph for Subcatchment 1S: 1A (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
5.30	0.34	0.02	0.00	0.04
5.40	0.35	0.02	0.00	0.05
5.50	0.36	0.02	0.00	0.05
5.60	0.37	0.02	0.00	0.05
5.70	0.38	0.03	0.00	0.06
5.80	0.38	0.03	0.00	0.06
5.90	0.39	0.03	0.00	0.06
6.00	0.40	0.03	0.00	0.07
6.10	0.41	0.04	0.00	0.07
6.20	0.42	0.04	0.00	0.07
6.30	0.43	0.04	0.00	0.08
6.40	0.44	0.05	0.00	0.08
6.50	0.45	0.05	0.00	0.09
6.60	0.46	0.05	0.00	0.09
6.70	0.47	0.06	0.00	0.10
6.80	0.48	0.06	0.00	0.11
6.90	0.49	0.07	0.00	0.11
7.00	0.50	0.07	0.00	0.12
7.10	0.51	0.08	0.00	0.13
7.20	0.52	0.08	0.00	0.13
7.30	0.53	0.09	0.00	0.14
7.40	0.55	0.09	0.00	0.15
7.50	0.56	0.10	0.00	0.15
7.60	0.57	0.10	0.00	0.16
7.70	0.58	0.11	0.00	0.17
7.80	0.60	0.11	0.00	0.17
7.90	0.61	0.12	0.00	0.18
8.00	0.62	0.13	0.00	0.19
8.10	0.63	0.13	0.00	0.19
8.20	0.65	0.14	0.00	0.20
8.30	0.66	0.15	0.00	0.21
8.40	0.68	0.16	0.00	0.23
8.50	0.70	0.17	0.00	0.25
8.60	0.72	0.18	0.00	0.26
8.70	0.74	0.19	0.00	0.29
8.80	0.76	0.21	0.00	0.31
8.90	0.79	0.22	0.00	0.33
9.00	0.81	0.24	0.00	0.36
9.10	0.84	0.25	0.00	0.39
9.20	0.87	0.27	0.00	0.42
9.30	0.90	0.29	0.00	0.46
9.40	0.93	0.31	0.00	0.50
9.50	0.97	0.34	0.00	0.55
9.60	1.02	0.37	0.00	0.62
9.70	1.11	0.43	0.00	0.77
9.80	1.24	0.54	0.00	1.06
9.90	1.48	0.73	0.00	1.62
10.00	1.65	0.86	0.00	2.20
10.10	1.70	0.91	0.00	<b>2.34</b>
10.20	1.75	0.95	0.00	2.24
10.30	1.80	0.99	0.00	2.12
10.40	1.83	1.02	0.00	2.00
10.50	1.87	1.05	0.00	1.87

**2-year calcs**

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**Hydrograph for Subcatchment 1S: 1A (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
10.60	1.89	1.07	0.00	1.75
10.70	1.92	1.09	0.00	1.62
10.80	1.95	1.12	0.00	1.51
10.90	1.97	1.14	0.00	1.41
11.00	1.99	1.16	0.00	1.32
11.10	2.02	1.18	0.00	1.23
11.20	2.04	1.20	0.00	1.16
11.30	2.06	1.21	0.00	1.09
11.40	2.08	1.23	0.00	1.03
11.50	2.10	1.25	0.00	0.97
11.60	2.12	1.27	0.00	0.92
11.70	2.14	1.28	0.00	0.88
11.80	2.15	1.30	0.00	0.84
11.90	2.17	1.31	0.00	0.80
12.00	2.19	1.33	0.00	0.77
12.10	2.21	1.35	0.00	0.74
12.20	2.22	1.36	0.00	0.71
12.30	2.24	1.37	0.00	0.68
12.40	2.25	1.39	0.00	0.66
12.50	2.27	1.40	0.00	0.64
12.60	2.28	1.42	0.00	0.62
12.70	2.30	1.43	0.00	0.60
12.80	2.31	1.44	0.00	0.58
12.90	2.33	1.46	0.00	0.57
13.00	2.34	1.47	0.00	0.55
13.10	2.36	1.48	0.00	0.54
13.20	2.37	1.49	0.00	0.52
13.30	2.38	1.50	0.00	0.51
13.40	2.39	1.52	0.00	0.49
13.50	2.41	1.53	0.00	0.48
13.60	2.42	1.54	0.00	0.47
13.70	2.43	1.55	0.00	0.46
13.80	2.44	1.56	0.00	0.45
13.90	2.45	1.57	0.00	0.43
14.00	2.46	1.58	0.00	0.42
14.10	2.47	1.59	0.00	0.41
14.20	2.48	1.60	0.00	0.40
14.30	2.50	1.61	0.00	0.39
14.40	2.51	1.62	0.00	0.39
14.50	2.52	1.62	0.00	0.38
14.60	2.53	1.63	0.00	0.37
14.70	2.54	1.64	0.00	0.37
14.80	2.55	1.65	0.00	0.36
14.90	2.56	1.66	0.00	0.36
15.00	2.57	1.67	0.00	0.35
15.10	2.58	1.68	0.00	0.35
15.20	2.59	1.69	0.00	0.35
15.30	2.60	1.70	0.00	0.34
15.40	2.61	1.71	0.00	0.34
15.50	2.62	1.72	0.00	0.34
15.60	2.62	1.72	0.00	0.33
15.70	2.63	1.73	0.00	0.33
15.80	2.64	1.74	0.00	0.33

**2-year calcs**

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**Hydrograph for Subcatchment 1S: 1A (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
15.90	2.65	1.75	0.00	0.32
16.00	2.66	1.76	0.00	0.32
16.10	2.67	1.77	0.00	0.32
16.20	2.68	1.78	0.00	0.32
16.30	2.69	1.78	0.00	0.31
16.40	2.70	1.79	0.00	0.31
16.50	2.71	1.80	0.00	0.31
16.60	2.72	1.81	0.00	0.31
16.70	2.73	1.82	0.00	0.31
16.80	2.73	1.83	0.00	0.30
16.90	2.74	1.83	0.00	0.30
17.00	2.75	1.84	0.00	0.30
17.10	2.76	1.85	0.00	0.30
17.20	2.77	1.86	0.00	0.30
17.30	2.78	1.86	0.00	0.29
17.40	2.79	1.87	0.00	0.29
17.50	2.79	1.88	0.00	0.29
17.60	2.80	1.89	0.00	0.29
17.70	2.81	1.90	0.00	0.29
17.80	2.82	1.90	0.00	0.28
17.90	2.83	1.91	0.00	0.28
18.00	2.84	1.92	0.00	0.28
18.10	2.84	1.93	0.00	0.28
18.20	2.85	1.93	0.00	0.28
18.30	2.86	1.94	0.00	0.27
18.40	2.87	1.95	0.00	0.27
18.50	2.87	1.95	0.00	0.27
18.60	2.88	1.96	0.00	0.27
18.70	2.89	1.97	0.00	0.26
18.80	2.90	1.98	0.00	0.26
18.90	2.90	1.98	0.00	0.26
19.00	2.91	1.99	0.00	0.26
19.10	2.92	2.00	0.00	0.26
19.20	2.93	2.00	0.00	0.25
19.30	2.93	2.01	0.00	0.25
19.40	2.94	2.02	0.00	0.25
19.50	2.95	2.02	0.00	0.25
19.60	2.96	2.03	0.00	0.25
19.70	2.96	2.04	0.00	0.24
19.80	2.97	2.04	0.00	0.24
19.90	2.98	2.05	0.00	0.24
20.00	2.98	2.05	0.00	0.24
20.10	2.99	2.06	0.00	0.24
20.20	3.00	2.07	0.00	0.23
20.30	3.00	2.07	0.00	0.23
20.40	3.01	2.08	0.00	0.23
20.50	3.02	2.09	0.00	0.23
20.60	3.02	2.09	0.00	0.23
20.70	3.03	2.10	0.00	0.22
20.80	3.03	2.10	0.00	0.22
20.90	3.04	2.11	0.00	0.22
21.00	3.05	2.11	0.00	0.22
21.10	3.05	2.12	0.00	0.22

**2-year calcs**

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**Hydrograph for Subcatchment 1S: 1A (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
21.20	3.06	2.13	0.00	0.21
21.30	3.06	2.13	0.00	0.21
21.40	3.07	2.14	0.00	0.21
21.50	3.08	2.14	0.00	0.21
21.60	3.08	2.15	0.00	0.21
21.70	3.09	2.15	0.00	0.20
21.80	3.09	2.16	0.00	0.20
21.90	3.10	2.16	0.00	0.20
22.00	3.10	2.17	0.00	0.20
22.10	3.11	2.17	0.00	0.19
22.20	3.11	2.18	0.00	0.19
22.30	3.12	2.18	0.00	0.19
22.40	3.13	2.19	0.00	0.19
22.50	3.13	2.19	0.00	0.19
22.60	3.14	2.20	0.00	0.18
22.70	3.14	2.20	0.00	0.18
22.80	3.15	2.21	0.00	0.18
22.90	3.15	2.21	0.00	0.18
23.00	3.16	2.22	0.00	0.18
23.10	3.16	2.22	0.00	0.17
23.20	3.16	2.23	0.00	0.17
23.30	3.17	2.23	0.00	0.17
23.40	3.17	2.23	0.00	0.17
23.50	3.18	2.24	0.00	0.17
23.60	3.18	2.24	0.00	0.16
23.70	3.19	2.25	0.00	0.16
23.80	3.19	2.25	0.00	0.16
23.90	3.20	2.25	0.00	0.16
24.00	<b>3.20</b>	<b>2.26</b>	0.00	0.15

**2-year calcs**

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**Summary for Reach 4R: (new Reach)**

Inflow Area = 3.540 ac, 0.00% Impervious, Inflow Depth > 2.23" for 2 event  
Inflow = 2.34 cfs @ 10.11 hrs, Volume= 0.658 af  
Outflow = 2.34 cfs @ 10.11 hrs, Volume= 0.658 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

**2-year calcs**

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**Hydrograph for Reach 4R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	5.30	0.04		0.04
0.10	0.00		0.00	5.40	0.05		0.05
0.20	0.00		0.00	5.50	0.05		0.05
0.30	0.00		0.00	5.60	0.05		0.05
0.40	0.00		0.00	5.70	0.06		0.06
0.50	0.00		0.00	5.80	0.06		0.06
0.60	0.00		0.00	5.90	0.06		0.06
0.70	0.00		0.00	6.00	0.07		0.07
0.80	0.00		0.00	6.10	0.07		0.07
0.90	0.00		0.00	6.20	0.07		0.07
1.00	0.00		0.00	6.30	0.08		0.08
1.10	0.00		0.00	6.40	0.08		0.08
1.20	0.00		0.00	6.50	0.09		0.09
1.30	0.00		0.00	6.60	0.09		0.09
1.40	0.00		0.00	6.70	0.10		0.10
1.50	0.00		0.00	6.80	0.11		0.11
1.60	0.00		0.00	6.90	0.11		0.11
1.70	0.00		0.00	7.00	0.12		0.12
1.80	0.00		0.00	7.10	0.13		0.13
1.90	0.00		0.00	7.20	0.13		0.13
2.00	0.00		0.00	7.30	0.14		0.14
2.10	0.00		0.00	7.40	0.15		0.15
2.20	0.00		0.00	7.50	0.15		0.15
2.30	0.00		0.00	7.60	0.16		0.16
2.40	0.00		0.00	7.70	0.17		0.17
2.50	0.00		0.00	7.80	0.17		0.17
2.60	0.00		0.00	7.90	0.18		0.18
2.70	0.00		0.00	8.00	0.19		0.19
2.80	0.00		0.00	8.10	0.19		0.19
2.90	0.00		0.00	8.20	0.20		0.20
3.00	0.00		0.00	8.30	0.21		0.21
3.10	0.00		0.00	8.40	0.23		0.23
3.20	0.00		0.00	8.50	0.25		0.25
3.30	0.00		0.00	8.60	0.26		0.26
3.40	0.00		0.00	8.70	0.29		0.29
3.50	0.00		0.00	8.80	0.31		0.31
3.60	0.00		0.00	8.90	0.33		0.33
3.70	0.00		0.00	9.00	0.36		0.36
3.80	0.00		0.00	9.10	0.39		0.39
3.90	0.00		0.00	9.20	0.42		0.42
4.00	0.01		0.01	9.30	0.46		0.46
4.10	0.01		0.01	9.40	0.50		0.50
4.20	0.01		0.01	9.50	0.55		0.55
4.30	0.01		0.01	9.60	0.62		0.62
4.40	0.02		0.02	9.70	0.77		0.77
4.50	0.02		0.02	9.80	1.06		1.06
4.60	0.02		0.02	9.90	1.62		1.62
4.70	0.03		0.03	10.00	2.20		2.20
4.80	0.03		0.03	10.10	<b>2.34</b>		<b>2.34</b>
4.90	0.03		0.03	10.20	2.24		2.24
5.00	0.03		0.03	10.30	2.12		2.12
5.10	0.04		0.04	10.40	2.00		2.00
5.20	0.04		0.04	10.50	1.87		1.87

**2-year calcs**

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**Hydrograph for Reach 4R: (new Reach) (continued)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
10.60	1.75		1.75	15.90	0.32		0.32
10.70	1.62		1.62	16.00	0.32		0.32
10.80	1.51		1.51	16.10	0.32		0.32
10.90	1.41		1.41	16.20	0.32		0.32
11.00	1.32		1.32	16.30	0.31		0.31
11.10	1.23		1.23	16.40	0.31		0.31
11.20	1.16		1.16	16.50	0.31		0.31
11.30	1.09		1.09	16.60	0.31		0.31
11.40	1.03		1.03	16.70	0.31		0.31
11.50	0.97		0.97	16.80	0.30		0.30
11.60	0.92		0.92	16.90	0.30		0.30
11.70	0.88		0.88	17.00	0.30		0.30
11.80	0.84		0.84	17.10	0.30		0.30
11.90	0.80		0.80	17.20	0.30		0.30
12.00	0.77		0.77	17.30	0.29		0.29
12.10	0.74		0.74	17.40	0.29		0.29
12.20	0.71		0.71	17.50	0.29		0.29
12.30	0.68		0.68	17.60	0.29		0.29
12.40	0.66		0.66	17.70	0.29		0.29
12.50	0.64		0.64	17.80	0.28		0.28
12.60	0.62		0.62	17.90	0.28		0.28
12.70	0.60		0.60	18.00	0.28		0.28
12.80	0.58		0.58	18.10	0.28		0.28
12.90	0.57		0.57	18.20	0.28		0.28
13.00	0.55		0.55	18.30	0.27		0.27
13.10	0.54		0.54	18.40	0.27		0.27
13.20	0.52		0.52	18.50	0.27		0.27
13.30	0.51		0.51	18.60	0.27		0.27
13.40	0.49		0.49	18.70	0.26		0.26
13.50	0.48		0.48	18.80	0.26		0.26
13.60	0.47		0.47	18.90	0.26		0.26
13.70	0.46		0.46	19.00	0.26		0.26
13.80	0.45		0.45	19.10	0.26		0.26
13.90	0.43		0.43	19.20	0.25		0.25
14.00	0.42		0.42	19.30	0.25		0.25
14.10	0.41		0.41	19.40	0.25		0.25
14.20	0.40		0.40	19.50	0.25		0.25
14.30	0.39		0.39	19.60	0.25		0.25
14.40	0.39		0.39	19.70	0.24		0.24
14.50	0.38		0.38	19.80	0.24		0.24
14.60	0.37		0.37	19.90	0.24		0.24
14.70	0.37		0.37	20.00	0.24		0.24
14.80	0.36		0.36	20.10	0.24		0.24
14.90	0.36		0.36	20.20	0.23		0.23
15.00	0.35		0.35	20.30	0.23		0.23
15.10	0.35		0.35	20.40	0.23		0.23
15.20	0.35		0.35	20.50	0.23		0.23
15.30	0.34		0.34	20.60	0.23		0.23
15.40	0.34		0.34	20.70	0.22		0.22
15.50	0.34		0.34	20.80	0.22		0.22
15.60	0.33		0.33	20.90	0.22		0.22
15.70	0.33		0.33	21.00	0.22		0.22
15.80	0.33		0.33	21.10	0.22		0.22

**2-year calcs**

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**Hydrograph for Reach 4R: (new Reach) (continued)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
21.20	0.21		0.21
21.30	0.21		0.21
21.40	0.21		0.21
21.50	0.21		0.21
21.60	0.21		0.21
21.70	0.20		0.20
21.80	0.20		0.20
21.90	0.20		0.20
22.00	0.20		0.20
22.10	0.19		0.19
22.20	0.19		0.19
22.30	0.19		0.19
22.40	0.19		0.19
22.50	0.19		0.19
22.60	0.18		0.18
22.70	0.18		0.18
22.80	0.18		0.18
22.90	0.18		0.18
23.00	0.18		0.18
23.10	0.17		0.17
23.20	0.17		0.17
23.30	0.17		0.17
23.40	0.17		0.17
23.50	0.17		0.17
23.60	0.16		0.16
23.70	0.16		0.16
23.80	0.16		0.16
23.90	0.16		0.16
24.00	0.15		0.15



***Proposed Runoff  
2Year Storm Event***

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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
<b>3.540</b>	89	Gravel roads, HSG C (1S)
3.540	89	<b>TOTAL AREA</b>

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
<b>3.540</b>	HSG C	1S
0.000	HSG D	
0.000	Other	
3.540		<b>TOTAL AREA</b>

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Time span=0.00-24.00 hrs, dt=0.10 hrs, 241 points

Runoff by SBUH method, Split Pervious/Imperv.

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: 1A-PROPOSED**

Runoff Area=3.540 ac 0.00% Impervious Runoff Depth>2.05"

Flow Length=610' Slope=0.0066 '/' Tc=40.9 min CN=89/0 Runoff=2.13 cfs 0.606 af

**Reach 4R: (new Reach)**

Inflow=2.13 cfs 0.606 af

Outflow=2.13 cfs 0.606 af

**Total Runoff Area = 3.540 ac Runoff Volume = 0.606 af Average Runoff Depth = 2.05"**  
**100.00% Pervious = 3.540 ac 0.00% Impervious = 0.000 ac**

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**Summary for Subcatchment 1S: 1A-PROPOSED**

Runoff = 2.13 cfs @ 10.11 hrs, Volume= 0.606 af, Depth> 2.05"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.10 hrs  
Type I 24-hr 2 Rainfall=3.20"

Area (ac)	CN	Description
3.540	89	Gravel roads, HSG C
3.540	89	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	300	0.0066	0.25		<b>Sheet Flow, 1A-1</b> Fallow n= 0.050 P2= 1.90"
19.8	300	0.0066	0.25		<b>Sheet Flow, 1A-2</b> Fallow n= 0.050 P2= 1.90"
1.3	10	0.0066	0.13		<b>Sheet Flow, 1A-3</b> Fallow n= 0.050 P2= 1.90"
40.9	610	Total			

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**Hydrograph for Subcatchment 1S: 1A-PROPOSED**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	<b>0.00</b>	0.00
0.10	0.01	0.00	0.00	0.00
0.20	0.01	0.00	0.00	0.00
0.30	0.02	0.00	0.00	0.00
0.40	0.02	0.00	0.00	0.00
0.50	0.03	0.00	0.00	0.00
0.60	0.03	0.00	0.00	0.00
0.70	0.04	0.00	0.00	0.00
0.80	0.04	0.00	0.00	0.00
0.90	0.05	0.00	0.00	0.00
1.00	0.06	0.00	0.00	0.00
1.10	0.06	0.00	0.00	0.00
1.20	0.07	0.00	0.00	0.00
1.30	0.07	0.00	0.00	0.00
1.40	0.08	0.00	0.00	0.00
1.50	0.08	0.00	0.00	0.00
1.60	0.09	0.00	0.00	0.00
1.70	0.10	0.00	0.00	0.00
1.80	0.10	0.00	0.00	0.00
1.90	0.11	0.00	0.00	0.00
2.00	0.11	0.00	0.00	0.00
2.10	0.12	0.00	0.00	0.00
2.20	0.12	0.00	0.00	0.00
2.30	0.13	0.00	0.00	0.00
2.40	0.14	0.00	0.00	0.00
2.50	0.14	0.00	0.00	0.00
2.60	0.15	0.00	0.00	0.00
2.70	0.15	0.00	0.00	0.00
2.80	0.16	0.00	0.00	0.00
2.90	0.17	0.00	0.00	0.00
3.00	0.17	0.00	0.00	0.00
3.10	0.18	0.00	0.00	0.00
3.20	0.19	0.00	0.00	0.00
3.30	0.19	0.00	0.00	0.00
3.40	0.20	0.00	0.00	0.00
3.50	0.21	0.00	0.00	0.00
3.60	0.21	0.00	0.00	0.00
3.70	0.22	0.00	0.00	0.00
3.80	0.23	0.00	0.00	0.00
3.90	0.24	0.00	0.00	0.00
4.00	0.24	0.00	0.00	0.00
4.10	0.25	0.00	0.00	0.00
4.20	0.26	0.00	0.00	0.00
4.30	0.27	0.00	0.00	0.00
4.40	0.27	0.00	0.00	0.00
4.50	0.28	0.00	0.00	0.00
4.60	0.29	0.00	0.00	0.00
4.70	0.30	0.00	0.00	0.01
4.80	0.30	0.00	0.00	0.01
4.90	0.31	0.00	0.00	0.01
5.00	0.32	0.00	0.00	0.01
5.10	0.33	0.00	0.00	0.02
5.20	0.34	0.01	0.00	0.02

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**Hydrograph for Subcatchment 1S: 1A-PROPOSED (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
5.30	0.34	0.01	0.00	0.02
5.40	0.35	0.01	0.00	0.02
5.50	0.36	0.01	0.00	0.03
5.60	0.37	0.01	0.00	0.03
5.70	0.38	0.01	0.00	0.03
5.80	0.38	0.01	0.00	0.03
5.90	0.39	0.02	0.00	0.04
6.00	0.40	0.02	0.00	0.04
6.10	0.41	0.02	0.00	0.04
6.20	0.42	0.02	0.00	0.05
6.30	0.43	0.02	0.00	0.05
6.40	0.44	0.02	0.00	0.05
6.50	0.45	0.03	0.00	0.06
6.60	0.46	0.03	0.00	0.06
6.70	0.47	0.03	0.00	0.07
6.80	0.48	0.04	0.00	0.07
6.90	0.49	0.04	0.00	0.08
7.00	0.50	0.04	0.00	0.08
7.10	0.51	0.05	0.00	0.09
7.20	0.52	0.05	0.00	0.10
7.30	0.53	0.05	0.00	0.10
7.40	0.55	0.06	0.00	0.11
7.50	0.56	0.06	0.00	0.11
7.60	0.57	0.07	0.00	0.12
7.70	0.58	0.07	0.00	0.13
7.80	0.60	0.08	0.00	0.13
7.90	0.61	0.08	0.00	0.14
8.00	0.62	0.09	0.00	0.14
8.10	0.63	0.09	0.00	0.15
8.20	0.65	0.10	0.00	0.16
8.30	0.66	0.11	0.00	0.17
8.40	0.68	0.11	0.00	0.18
8.50	0.70	0.12	0.00	0.20
8.60	0.72	0.13	0.00	0.21
8.70	0.74	0.14	0.00	0.23
8.80	0.76	0.15	0.00	0.25
8.90	0.79	0.16	0.00	0.27
9.00	0.81	0.18	0.00	0.30
9.10	0.84	0.19	0.00	0.32
9.20	0.87	0.21	0.00	0.35
9.30	0.90	0.23	0.00	0.39
9.40	0.93	0.25	0.00	0.43
9.50	0.97	0.27	0.00	0.47
9.60	1.02	0.30	0.00	0.53
9.70	1.11	0.35	0.00	0.67
9.80	1.24	0.44	0.00	0.93
9.90	1.48	0.62	0.00	1.45
10.00	1.65	0.74	0.00	1.99
10.10	1.70	0.79	0.00	<b>2.13</b>
10.20	1.75	0.83	0.00	2.04
10.30	1.80	0.86	0.00	1.94
10.40	1.83	0.89	0.00	1.84
10.50	1.87	0.92	0.00	1.72

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**Hydrograph for Subcatchment 1S: 1A-PROPOSED (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
10.60	1.89	0.94	0.00	1.61
10.70	1.92	0.96	0.00	1.50
10.80	1.95	0.98	0.00	1.40
10.90	1.97	1.00	0.00	1.31
11.00	1.99	1.02	0.00	1.22
11.10	2.02	1.04	0.00	1.15
11.20	2.04	1.06	0.00	1.08
11.30	2.06	1.08	0.00	1.01
11.40	2.08	1.09	0.00	0.96
11.50	2.10	1.11	0.00	0.91
11.60	2.12	1.13	0.00	0.87
11.70	2.14	1.14	0.00	0.83
11.80	2.15	1.16	0.00	0.79
11.90	2.17	1.17	0.00	0.76
12.00	2.19	1.19	0.00	0.72
12.10	2.21	1.20	0.00	0.70
12.20	2.22	1.21	0.00	0.67
12.30	2.24	1.23	0.00	0.65
12.40	2.25	1.24	0.00	0.62
12.50	2.27	1.26	0.00	0.60
12.60	2.28	1.27	0.00	0.59
12.70	2.30	1.28	0.00	0.57
12.80	2.31	1.29	0.00	0.55
12.90	2.33	1.31	0.00	0.54
13.00	2.34	1.32	0.00	0.52
13.10	2.36	1.33	0.00	0.51
13.20	2.37	1.34	0.00	0.50
13.30	2.38	1.35	0.00	0.48
13.40	2.39	1.36	0.00	0.47
13.50	2.41	1.37	0.00	0.46
13.60	2.42	1.38	0.00	0.45
13.70	2.43	1.39	0.00	0.44
13.80	2.44	1.40	0.00	0.43
13.90	2.45	1.41	0.00	0.42
14.00	2.46	1.42	0.00	0.41
14.10	2.47	1.43	0.00	0.40
14.20	2.48	1.44	0.00	0.39
14.30	2.50	1.45	0.00	0.38
14.40	2.51	1.46	0.00	0.37
14.50	2.52	1.47	0.00	0.36
14.60	2.53	1.48	0.00	0.36
14.70	2.54	1.49	0.00	0.35
14.80	2.55	1.50	0.00	0.35
14.90	2.56	1.50	0.00	0.34
15.00	2.57	1.51	0.00	0.34
15.10	2.58	1.52	0.00	0.34
15.20	2.59	1.53	0.00	0.33
15.30	2.60	1.54	0.00	0.33
15.40	2.61	1.55	0.00	0.33
15.50	2.62	1.56	0.00	0.32
15.60	2.62	1.56	0.00	0.32
15.70	2.63	1.57	0.00	0.32
15.80	2.64	1.58	0.00	0.31



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**Hydrograph for Subcatchment 1S: 1A-PROPOSED (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
15.90	2.65	1.59	0.00	0.31
16.00	2.66	1.60	0.00	0.31
16.10	2.67	1.61	0.00	0.31
16.20	2.68	1.61	0.00	0.31
16.30	2.69	1.62	0.00	0.30
16.40	2.70	1.63	0.00	0.30
16.50	2.71	1.64	0.00	0.30
16.60	2.72	1.65	0.00	0.30
16.70	2.73	1.65	0.00	0.29
16.80	2.73	1.66	0.00	0.29
16.90	2.74	1.67	0.00	0.29
17.00	2.75	1.68	0.00	0.29
17.10	2.76	1.68	0.00	0.29
17.20	2.77	1.69	0.00	0.29
17.30	2.78	1.70	0.00	0.28
17.40	2.79	1.71	0.00	0.28
17.50	2.79	1.72	0.00	0.28
17.60	2.80	1.72	0.00	0.28
17.70	2.81	1.73	0.00	0.28
17.80	2.82	1.74	0.00	0.27
17.90	2.83	1.74	0.00	0.27
18.00	2.84	1.75	0.00	0.27
18.10	2.84	1.76	0.00	0.27
18.20	2.85	1.77	0.00	0.27
18.30	2.86	1.77	0.00	0.26
18.40	2.87	1.78	0.00	0.26
18.50	2.87	1.79	0.00	0.26
18.60	2.88	1.79	0.00	0.26
18.70	2.89	1.80	0.00	0.26
18.80	2.90	1.81	0.00	0.25
18.90	2.90	1.81	0.00	0.25
19.00	2.91	1.82	0.00	0.25
19.10	2.92	1.83	0.00	0.25
19.20	2.93	1.83	0.00	0.25
19.30	2.93	1.84	0.00	0.24
19.40	2.94	1.85	0.00	0.24
19.50	2.95	1.85	0.00	0.24
19.60	2.96	1.86	0.00	0.24
19.70	2.96	1.87	0.00	0.24
19.80	2.97	1.87	0.00	0.23
19.90	2.98	1.88	0.00	0.23
20.00	2.98	1.88	0.00	0.23
20.10	2.99	1.89	0.00	0.23
20.20	3.00	1.90	0.00	0.23
20.30	3.00	1.90	0.00	0.23
20.40	3.01	1.91	0.00	0.22
20.50	3.02	1.91	0.00	0.22
20.60	3.02	1.92	0.00	0.22
20.70	3.03	1.93	0.00	0.22
20.80	3.03	1.93	0.00	0.22
20.90	3.04	1.94	0.00	0.21
21.00	3.05	1.94	0.00	0.21
21.10	3.05	1.95	0.00	0.21

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**Hydrograph for Subcatchment 1S: 1A-PROPOSED (continued)**

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
21.20	3.06	1.95	0.00	0.21
21.30	3.06	1.96	0.00	0.21
21.40	3.07	1.96	0.00	0.20
21.50	3.08	1.97	0.00	0.20
21.60	3.08	1.97	0.00	0.20
21.70	3.09	1.98	0.00	0.20
21.80	3.09	1.98	0.00	0.20
21.90	3.10	1.99	0.00	0.19
22.00	3.10	1.99	0.00	0.19
22.10	3.11	2.00	0.00	0.19
22.20	3.11	2.00	0.00	0.19
22.30	3.12	2.01	0.00	0.19
22.40	3.13	2.01	0.00	0.18
22.50	3.13	2.02	0.00	0.18
22.60	3.14	2.02	0.00	0.18
22.70	3.14	2.03	0.00	0.18
22.80	3.15	2.03	0.00	0.18
22.90	3.15	2.04	0.00	0.17
23.00	3.16	2.04	0.00	0.17
23.10	3.16	2.05	0.00	0.17
23.20	3.16	2.05	0.00	0.17
23.30	3.17	2.05	0.00	0.16
23.40	3.17	2.06	0.00	0.16
23.50	3.18	2.06	0.00	0.16
23.60	3.18	2.07	0.00	0.16
23.70	3.19	2.07	0.00	0.16
23.80	3.19	2.07	0.00	0.15
23.90	3.20	2.08	0.00	0.15
24.00	<b>3.20</b>	<b>2.08</b>	0.00	0.15

**1A-2-year\_PROPOSED**

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Type I 24-hr 2 Rainfall=3.20"

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**Summary for Reach 4R: (new Reach)**

Inflow Area = 3.540 ac, 0.00% Impervious, Inflow Depth > 2.05" for 2 event  
Inflow = 2.13 cfs @ 10.11 hrs, Volume= 0.606 af  
Outflow = 2.13 cfs @ 10.11 hrs, Volume= 0.606 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

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**Hydrograph for Reach 4R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	5.30	0.02		0.02
0.10	0.00		0.00	5.40	0.02		0.02
0.20	0.00		0.00	5.50	0.03		0.03
0.30	0.00		0.00	5.60	0.03		0.03
0.40	0.00		0.00	5.70	0.03		0.03
0.50	0.00		0.00	5.80	0.03		0.03
0.60	0.00		0.00	5.90	0.04		0.04
0.70	0.00		0.00	6.00	0.04		0.04
0.80	0.00		0.00	6.10	0.04		0.04
0.90	0.00		0.00	6.20	0.05		0.05
1.00	0.00		0.00	6.30	0.05		0.05
1.10	0.00		0.00	6.40	0.05		0.05
1.20	0.00		0.00	6.50	0.06		0.06
1.30	0.00		0.00	6.60	0.06		0.06
1.40	0.00		0.00	6.70	0.07		0.07
1.50	0.00		0.00	6.80	0.07		0.07
1.60	0.00		0.00	6.90	0.08		0.08
1.70	0.00		0.00	7.00	0.08		0.08
1.80	0.00		0.00	7.10	0.09		0.09
1.90	0.00		0.00	7.20	0.10		0.10
2.00	0.00		0.00	7.30	0.10		0.10
2.10	0.00		0.00	7.40	0.11		0.11
2.20	0.00		0.00	7.50	0.11		0.11
2.30	0.00		0.00	7.60	0.12		0.12
2.40	0.00		0.00	7.70	0.13		0.13
2.50	0.00		0.00	7.80	0.13		0.13
2.60	0.00		0.00	7.90	0.14		0.14
2.70	0.00		0.00	8.00	0.14		0.14
2.80	0.00		0.00	8.10	0.15		0.15
2.90	0.00		0.00	8.20	0.16		0.16
3.00	0.00		0.00	8.30	0.17		0.17
3.10	0.00		0.00	8.40	0.18		0.18
3.20	0.00		0.00	8.50	0.20		0.20
3.30	0.00		0.00	8.60	0.21		0.21
3.40	0.00		0.00	8.70	0.23		0.23
3.50	0.00		0.00	8.80	0.25		0.25
3.60	0.00		0.00	8.90	0.27		0.27
3.70	0.00		0.00	9.00	0.30		0.30
3.80	0.00		0.00	9.10	0.32		0.32
3.90	0.00		0.00	9.20	0.35		0.35
4.00	0.00		0.00	9.30	0.39		0.39
4.10	0.00		0.00	9.40	0.43		0.43
4.20	0.00		0.00	9.50	0.47		0.47
4.30	0.00		0.00	9.60	0.53		0.53
4.40	0.00		0.00	9.70	0.67		0.67
4.50	0.00		0.00	9.80	0.93		0.93
4.60	0.00		0.00	9.90	1.45		1.45
4.70	0.01		0.01	10.00	1.99		1.99
4.80	0.01		0.01	10.10	<b>2.13</b>		<b>2.13</b>
4.90	0.01		0.01	10.20	2.04		2.04
5.00	0.01		0.01	10.30	1.94		1.94
5.10	0.02		0.02	10.40	1.84		1.84
5.20	0.02		0.02	10.50	1.72		1.72

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Type I 24-hr 2 Rainfall=3.20"

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**Hydrograph for Reach 4R: (new Reach) (continued)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
10.60	1.61		1.61	15.90	0.31		0.31
10.70	1.50		1.50	16.00	0.31		0.31
10.80	1.40		1.40	16.10	0.31		0.31
10.90	1.31		1.31	16.20	0.31		0.31
11.00	1.22		1.22	16.30	0.30		0.30
11.10	1.15		1.15	16.40	0.30		0.30
11.20	1.08		1.08	16.50	0.30		0.30
11.30	1.01		1.01	16.60	0.30		0.30
11.40	0.96		0.96	16.70	0.29		0.29
11.50	0.91		0.91	16.80	0.29		0.29
11.60	0.87		0.87	16.90	0.29		0.29
11.70	0.83		0.83	17.00	0.29		0.29
11.80	0.79		0.79	17.10	0.29		0.29
11.90	0.76		0.76	17.20	0.29		0.29
12.00	0.72		0.72	17.30	0.28		0.28
12.10	0.70		0.70	17.40	0.28		0.28
12.20	0.67		0.67	17.50	0.28		0.28
12.30	0.65		0.65	17.60	0.28		0.28
12.40	0.62		0.62	17.70	0.28		0.28
12.50	0.60		0.60	17.80	0.27		0.27
12.60	0.59		0.59	17.90	0.27		0.27
12.70	0.57		0.57	18.00	0.27		0.27
12.80	0.55		0.55	18.10	0.27		0.27
12.90	0.54		0.54	18.20	0.27		0.27
13.00	0.52		0.52	18.30	0.26		0.26
13.10	0.51		0.51	18.40	0.26		0.26
13.20	0.50		0.50	18.50	0.26		0.26
13.30	0.48		0.48	18.60	0.26		0.26
13.40	0.47		0.47	18.70	0.26		0.26
13.50	0.46		0.46	18.80	0.25		0.25
13.60	0.45		0.45	18.90	0.25		0.25
13.70	0.44		0.44	19.00	0.25		0.25
13.80	0.43		0.43	19.10	0.25		0.25
13.90	0.42		0.42	19.20	0.25		0.25
14.00	0.41		0.41	19.30	0.24		0.24
14.10	0.40		0.40	19.40	0.24		0.24
14.20	0.39		0.39	19.50	0.24		0.24
14.30	0.38		0.38	19.60	0.24		0.24
14.40	0.37		0.37	19.70	0.24		0.24
14.50	0.36		0.36	19.80	0.23		0.23
14.60	0.36		0.36	19.90	0.23		0.23
14.70	0.35		0.35	20.00	0.23		0.23
14.80	0.35		0.35	20.10	0.23		0.23
14.90	0.34		0.34	20.20	0.23		0.23
15.00	0.34		0.34	20.30	0.23		0.23
15.10	0.34		0.34	20.40	0.22		0.22
15.20	0.33		0.33	20.50	0.22		0.22
15.30	0.33		0.33	20.60	0.22		0.22
15.40	0.33		0.33	20.70	0.22		0.22
15.50	0.32		0.32	20.80	0.22		0.22
15.60	0.32		0.32	20.90	0.21		0.21
15.70	0.32		0.32	21.00	0.21		0.21
15.80	0.31		0.31	21.10	0.21		0.21

**1A-2-year\_PROPOSED**

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**Hydrograph for Reach 4R: (new Reach) (continued)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
21.20	0.21		0.21
21.30	0.21		0.21
21.40	0.20		0.20
21.50	0.20		0.20
21.60	0.20		0.20
21.70	0.20		0.20
21.80	0.20		0.20
21.90	0.19		0.19
22.00	0.19		0.19
22.10	0.19		0.19
22.20	0.19		0.19
22.30	0.19		0.19
22.40	0.18		0.18
22.50	0.18		0.18
22.60	0.18		0.18
22.70	0.18		0.18
22.80	0.18		0.18
22.90	0.17		0.17
23.00	0.17		0.17
23.10	0.17		0.17
23.20	0.17		0.17
23.30	0.16		0.16
23.40	0.16		0.16
23.50	0.16		0.16
23.60	0.16		0.16
23.70	0.16		0.16
23.80	0.15		0.15
23.90	0.15		0.15
24.00	0.15		0.15

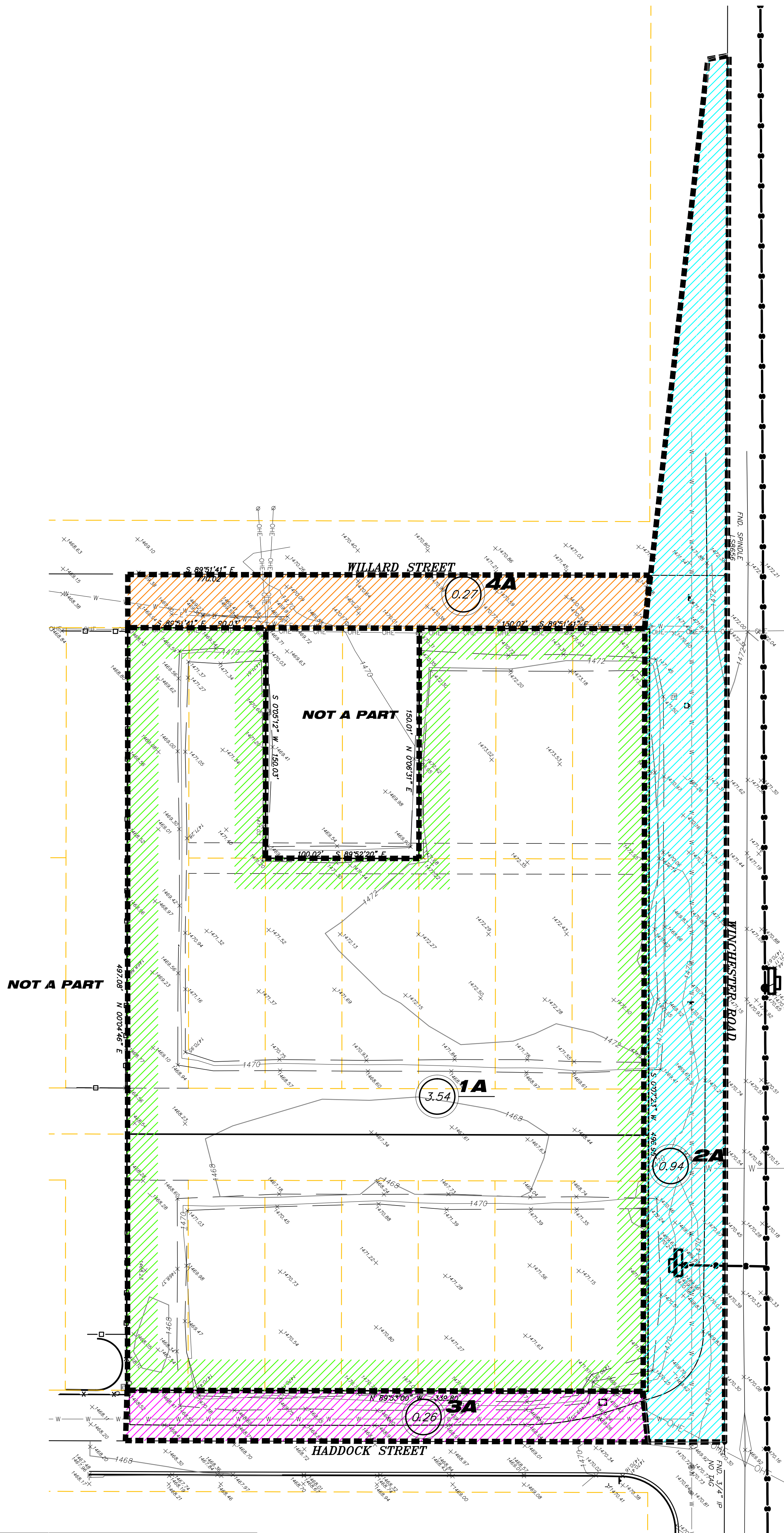
**EXHIBITS**

**EXHIBIT A: EXISTING CONDITIONS DRAINAGE CONCEPT MAP**



# Riverside County

## Existing Conditions

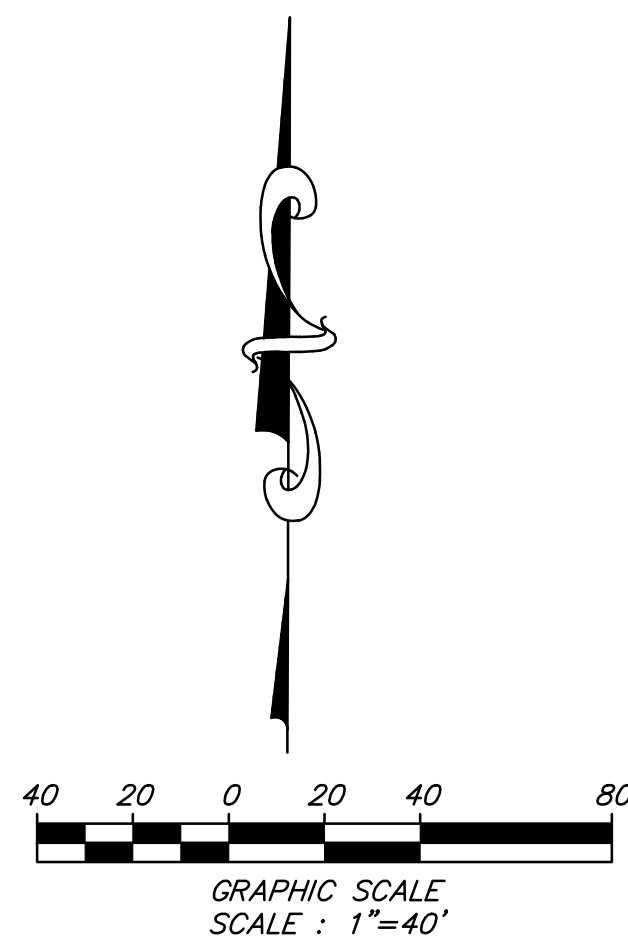


### LEGEND:

- |  |   |  |                    |
|--|---|--|--------------------|
|  | DAYLIGHT LINE                           |  | TC TOP OF CURB     |
|  | TRACT BOUNDARY                          |  | FL FLOWLINE        |
|  | MATCH LINE                              |  | FS FINISH SURFACE  |
|  | EXISTING CONTOUR LINES                  |  | FG FINISH GRADE    |
|  | BLOCK WALL & RETAINING WALL             |  | TW TOP OF WALL     |
|  | PROPOSED GRADE ELEVATIONS               |  | TF TOP OF FOOTING  |
|  | EXISTING GRADE ELEVATIONS               |  | BW BACK OF WALK    |
|  | DRAINAGE SWALE OR DIRECTION OF FLOW     |  | GR EX. GROUND      |
|  | SLOPE BANK (2:1) UNLESS OTHERWISE SHOWN |  | 44.5 PAD ELEVATION |

AREA (Acres)  
DRAINAGE AREA

**811**  
Know what's below.  
Call before you dig.  
AT LEAST TWO DAYS BEFORE YOU DIG  
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

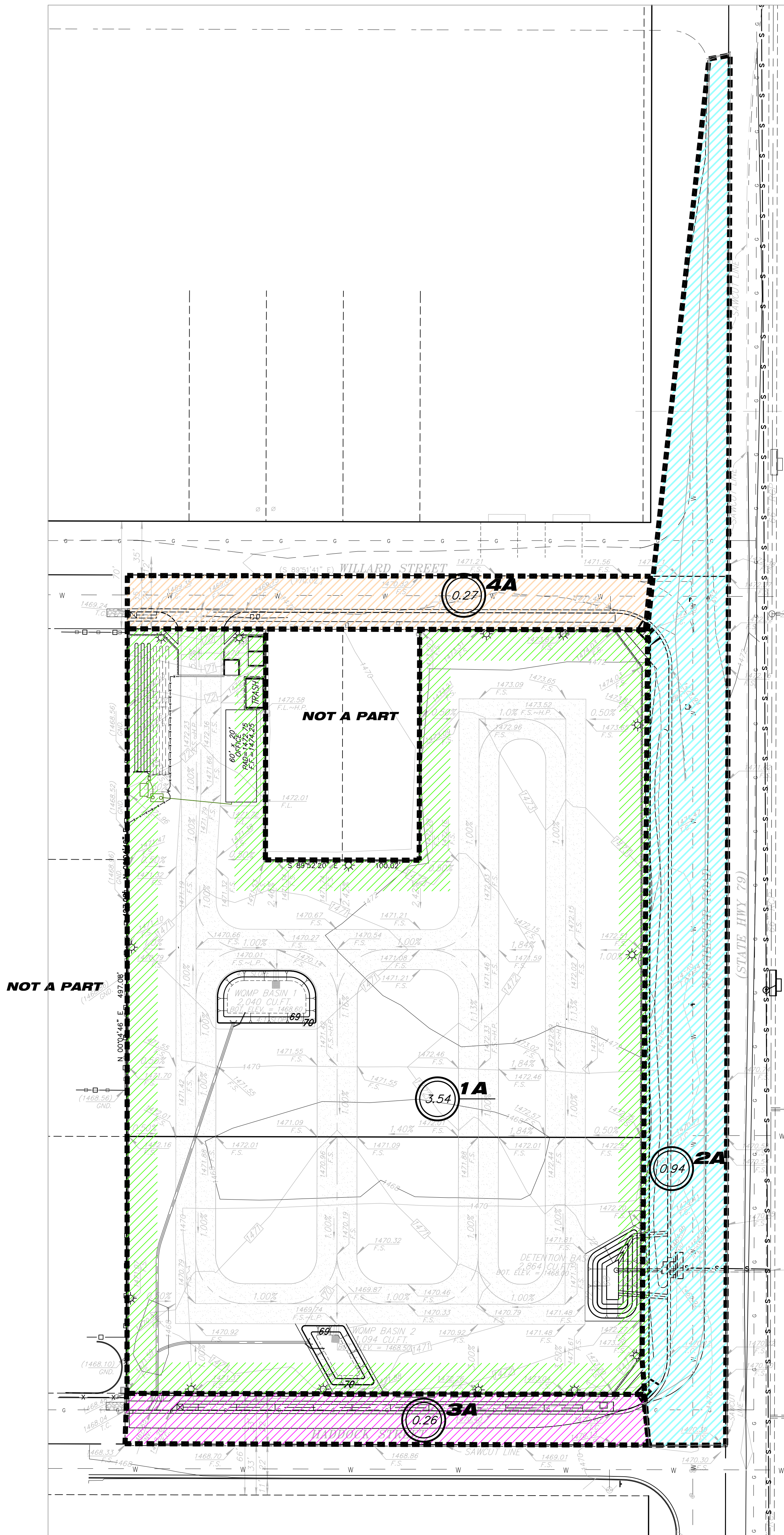


RIVERSIDE COUNTY		SHEET
DRAINAGE AREAS		
WINCHESTER		OF
APN: 462-182-018 & 462-185-006		

**EXHIBIT B: PROPOSED CONDITIONS DRAINAGE CONCEPT MAP**

# Riverside County

## Proposed Conditions



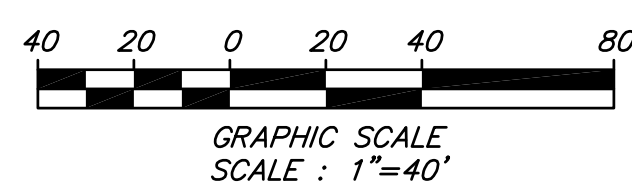
### LEGEND:

- |                  |   |        |                |
|------------------|---|--------|----------------|
| —○—○—            | DAYLIGHT LINE                           | TC     | TOP OF CURB    |
| —                | TRACT BOUNDARY                          | FL     | FLOWLINE       |
| —                | MATCH LINE                              | FS     | FINISH SURFACE |
| - - - (XX) - - - | EXISTING CONTOUR LINES                  | FG     | FINISH GRADE   |
| - - - - -        | BLOCK WALL & RETAINING WALL             | TW     | TOP OF WALL    |
| XX.XX            | PROPOSED GRADE ELEVATIONS               | TF     | TOP OF FOOTING |
| (XX.XX)          | EXISTING GRADE ELEVATIONS               | BW     | BACK OF WALK   |
| ←                | DRAINAGE SWALE OR DIRECTION OF FLOW     | GR     | EX. GROUND     |
| Y                | SLOPE BANK (2:1) UNLESS OTHERWISE SHOWN | (44.5) | PAD ELEVATION  |

AREA (Acres)  
DRAINAGE AREA



811  
AT LEAST TWO DAYS BEFORE YOU DIG  
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA



RIVERSIDE COUNTY		SHEET
DRAINAGE AREAS PROPOSED CONDITIONS		
WINCHESTER		1 OF 1
APN: 462-182-018 & 462-185-006		