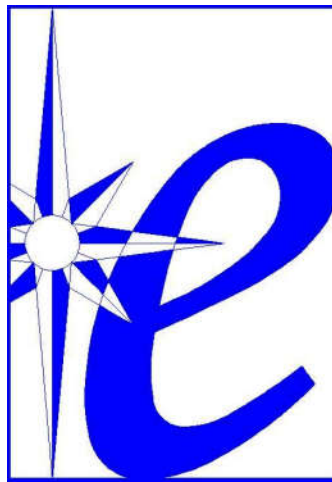


TENTATIVE TRACT 38151

Jurupa Valley, CA

PRELIMINARY DRAINAGE STUDY

May 6, 2021



Reference [job number]

PREPARED BY:

Encompass Associates, Inc.

5699 Cousins Place
Rancho Cucamonga, CA 91737
909-684-0093

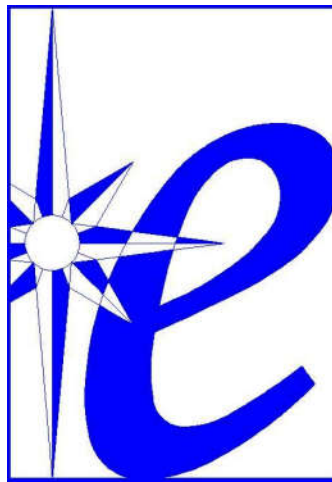
Fax-909-586-6979
askers@encompasscivil.com
www.encompasscivil.com

TENTATIVE TRACT 38151

Jurupa Valley, CA

PRELIMINARY DRAINAGE STUDY

May 6, 2021



Reference 155-238.006

PREPARED BY:

Encompass Associates, Inc.

5699 Cousins Place

Rancho Cucamonga, CA 91737

909-684-0093

Fax-909-586-6979

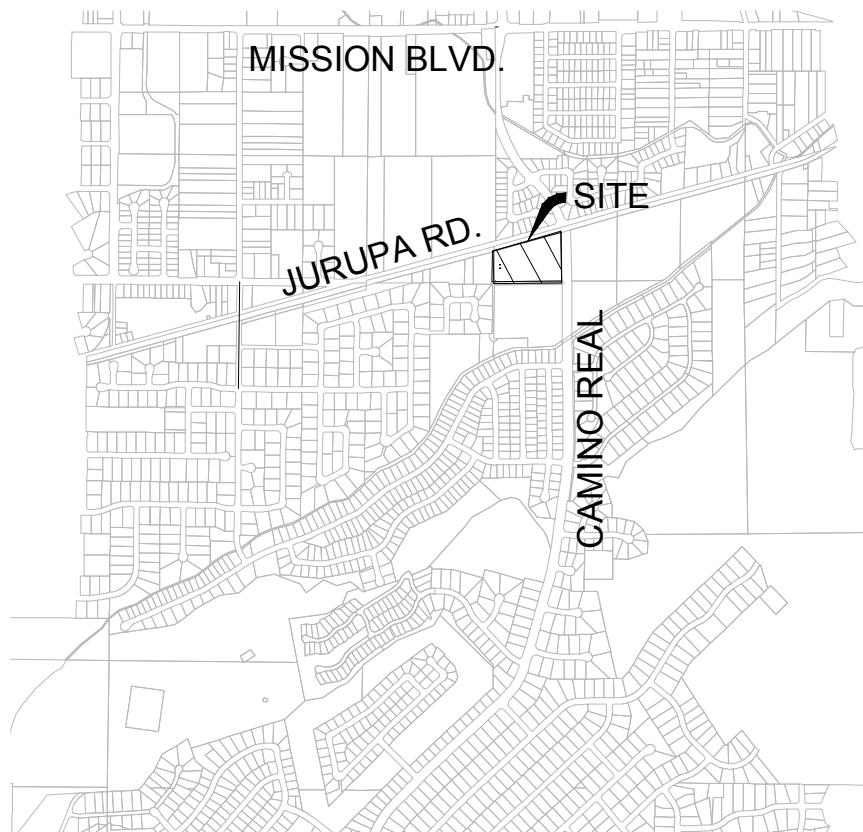
Aaron T. Skeers
R.C.E. 62183 Exp. 9/30/21

Date

askeers@encompasscivil.com
www.encompasscivil.com

CONTENTS

SECTION	TITLE
□ <i>A</i>	<i>DISCUSSION</i> □ <i>Vicinity Map</i> □ <i>Index Map</i>
□ <i>Q</i>	<i>100-YEAR HYDROLOGY</i>
□ <i>D</i>	<i>100-YEAR HYDRAULICS</i> □ <i>STREET FLOW DEPTH & CATCH BASIN SIZING</i> □ <i>PIPE HYDRAULICS</i>
□ <i>R</i>	<i>REFERENCES & MAPS</i> □ <i>Soils Map (from County Hydrology Manual)</i> □ <i>Isohyetal Map (from County Hydrology Manual)</i> □ <i>Street Cross-section Diagrams</i> □ <i>Drainage System Outlet Reference Drawings & Hydraulics</i> □ <i>Hydrology Map</i>



VICINITY MAP
1"=2000'

DISCUSSION

The purpose of this preliminary drainage study is to determine the drainage facility requirements for Tentative Tract 38151 in Jurupa Valley. Specifically, the subject project is located south of Jurupa Road and the Union Pacific Railroad, west of Kirby Drive and low density residential properties, north of Flood Control right-of-way and Camino Real Elementary School, and east of Camino Real, Centennial Park and a regional detention basin, in the City of Jurupa Valley, County of San Bernardino, California.

The subject site will consist of 36 condominium single-family (detached) residences, with an approximate area of 6.6 acres. Proposed drainage overland and by sheet flow generally in a southwesterly direction. The site is not subject to off-site runoff.

The 100-year storm event was modeled in the rational method hydrology calculations in this study. Drainage is predominately from northeast to southwest. On-site flows will be directed to a BMP prior to discharge off-site. An underground perforated pipe infiltration system is proposed along the southerly common space.

Overflow from the infiltration system will be directed to the existing RCFC&WCD 57-inch Jurupa Channel (Stage 2) storm drain located adjacent south of the project, via a proposed new lateral connection.

The rational method hydrologic model, as defined by RCFC&WCD, was followed in the determination of storm runoff. AES software was utilized for hydrology calculations and some street flow depth analysis. Additional street flow analysis and catch basin sizing are determined utilizing spreadsheet-driven hydraulic algorithms. FHWA's Hydraulic Toolbox and/or CivilDesign's WSPGW hydraulic software program was used to validate pipe sizes.

RATIONAL METHOD

HYDROLOGY



Encompass Associates, Inc.

Civil Engineers

5699 Cousins Place

Rancho Cucamonga, CA 91737

(909) 684-0093 Fax 586-6979

Job TTM 38151

Sheet No. 1 of 1

Calculated by: ats Date 5/6/21

Checked by: _____ Date: _____

Scale nts

RATIONAL METHOD CALCULATION FORM (Plate D-2 RCFC&WCD Manual)

Drainage Area	Soil & Development	A Acres	I in/hr	C	ΔQ CFS	ΣQ CFS	Slope	Section inches	v FPS	L FT.	T Min.	ST Min.	Remarks and Hydraulic Calculation Ref.
Pre 1 (total)	C-grass poor	6.62	2.23	0.769	11.36	16.5						16.5	
						11.36							
Dev 1 (total)	C-5-7du/ac	6.62	2.37	0.815	12.78	14.6						14.6	

Time of Concentration Calculation*Per Riverside County FC&WCD Hydrology Manual*

TTM 38151

5/6/2021

Subbasin	Area (AC)	HP (ft)	LP (ft)	L (ft)	Lca (ft)	Basin Factor	S-Curve	Cover type	Hydrologic Soil Group	RI	Ap	Tc (min)
Pre 1 (total)	6.62	848	829	838	419		Valley	grass poor	C	78	100%	16.5
Dev 1 (total)	6.62	844	834	912	456		Valley	5-7du/ac	C	70	50%	14.6

STREET FLOW DEPTH

AND

CATCH BASIN CAPACITY

CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title: TTM 38151 Jurupa Valley Condos

Designer: ATS / Encompass Associates, Inc.

Project Date: Thursday, May 6, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Channel Analysis - Street half-width at 1%

Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	0.70	0.0150
10.00	0.50	0.0150
10.20	0.00	0.0150
12.00	0.16	0.0150
28.00	0.48	-----

Longitudinal Slope: 0.0100 ft/ft

Depth: 0.4800 ft

Result Parameters

Flow: 10.5621 cfs

Area of Flow: 3.3261 ft²

Wetted Perimeter: 18.3273 ft

Hydraulic Radius: 0.1815 ft

Average Velocity: 3.1755 ft/s

Top Width: 17.9920 ft

Froude Number: 1.3016

Critical Depth: 0.5188 ft

Critical Velocity: 2.6186 ft/s

Critical Slope: 0.0056 ft/ft

Critical Top Width: 18.94 ft

Calculated Max Shear Stress: 0.2995 lb/ft²

Calculated Avg Shear Stress: 0.1132 lb/ft²

Composite Manning's n Equation: Lotter method

Manning's n: 0.015

Channel Analysis: Channel Analysis - Street full-width at 1%

Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	0.70	0.0150
10.00	0.50	0.0150
10.20	0.00	0.0150
12.00	0.16	0.0150
28.00	0.48	0.0150
44.00	0.16	0.0150
45.80	0.00	0.0150
46.00	0.50	0.0150
56.00	0.70	-----

Longitudinal Slope: 0.0100 ft/ft

Flow: 13.0000 cfs

Result Parameters

Depth: 0.4177 ft

Area of Flow: 4.6060 ft²

Wetted Perimeter: 30.2892 ft

Hydraulic Radius: 0.1521 ft

Average Velocity: 2.8224 ft/s

Top Width: 29.7043 ft

Froude Number: 1.2631

Critical Depth: 0.4483 ft

Critical Velocity: 2.3372 ft/s

Critical Slope: 0.0061 ft/ft

Critical Top Width: 32.79 ft

Calculated Max Shear Stress: 0.2606 lb/ft²

Calculated Avg Shear Stress: 0.0949 lb/ft²

Composite Manning's n Equation: Lotter method

Manning's n: 0.0150

Curb and Gutter Analysis: Curb and Gutter Analysis - Nly CB

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0100 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0830 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Design Flow: 10.5000 cfs

Gutter Result Parameters

Width of Spread: 16.3360 ft

Gutter Depression: 1.5120 in

Area of Flow: 2.7946 ft²

Eo (Gutter Flow to Total Flow): 0.3650

Gutter Depth at Curb: 5.4326 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 21.0000 ft

Local Depression: 0.1700 in

Inlet Result Parameters

Intercepted Flow: 8.9521 cfs

Bypass Flow: 1.5479 cfs

Efficiency: 0.8526

Channel Analysis: Channel Analysis - Storm Drain - Nly CB to Confl

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0100

Flow: 10.5000 cfs

Result Parameters

Depth: 1.1767 ft

Area of Flow: 1.9224 ft²

Wetted Perimeter: 3.4969 ft

Hydraulic Radius: 0.5497 ft

Average Velocity: 5.4620 ft/s

Top Width: 1.9685 ft

Froude Number: 0.9741

Critical Depth: 1.1602 ft

Critical Velocity: 5.5563 ft/s

Critical Slope: 0.0031 ft/ft

Critical Top Width: 1.97 ft

Calculated Max Shear Stress: 0.2203 lb/ft²

Calculated Avg Shear Stress: 0.1029 lb/ft²

Curb and Gutter Analysis: Curb and Gutter Analysis - Sly CB

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0100 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Depressed Gutter Geometry

Cross-Slope of Gutter: 0.0830 ft/ft

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Design Flow: 2.2800 cfs

Gutter Result Parameters

Width of Spread: 8.3485 ft

Gutter Depression: 1.5120 in

Area of Flow: 0.8230 ft²

E_o (Gutter Flow to Total Flow): 0.6673

Gutter Depth at Curb: 3.5156 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 10.0000 ft

Local Depression: 0.1700 in

Inlet Result Parameters

Intercepted Flow: 2.0845 cfs

Bypass Flow: 0.1955 cfs

Efficiency: 0.9143

Channel Analysis: Channel Analysis - Storm Drain - Sly CB to Confl

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0100

Flow: 2.2800 cfs

Result Parameters

Depth: 0.5682 ft

Area of Flow: 0.6135 ft²

Wetted Perimeter: 1.9889 ft

Hydraulic Radius: 0.3085 ft

Average Velocity: 3.7161 ft/s

Top Width: 1.4553 ft

Froude Number: 1.0086

Critical Depth: 0.5706 ft

Critical Velocity: 3.6953 ft/s

Critical Slope: 0.0030 ft/ft

Critical Top Width: 1.46 ft

Calculated Max Shear Stress: 0.1064 lb/ft²

Calculated Avg Shear Stress: 0.0577 lb/ft²

Channel Analysis: Channel Analysis - Storm Drain - Confl to BMP

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0100

Flow: 12.7800 cfs

Result Parameters

Depth: 1.3450 ft

Area of Flow: 2.2468 ft²

Wetted Perimeter: 3.8460 ft

Hydraulic Radius: 0.5842 ft

Average Velocity: 5.6880 ft/s

Top Width: 1.8772 ft

Froude Number: 0.9162

Critical Depth: 1.2852 ft

Critical Velocity: 5.9908 ft/s

Critical Slope: 0.0034 ft/ft

Critical Top Width: 1.92 ft

Calculated Max Shear Stress: 0.2518 lb/ft²

Calculated Avg Shear Stress: 0.1094 lb/ft²

REFERENCES & MAPS



WQMP Project Report

County of Riverside Stormwater Program

Santa Ana River Watershed Geodatabase

Thursday, April 30, 2020

Note: The information provided in this report and on the Stormwater Geodatabase for the County of Riverside Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	183030014
Latitude/Longitude:	34.0052, -117.448
Thomas Brothers Page:	
Project Site Acreage:	6.34
Watershed(s):	SANTA ANA
This Project Site Resides in the following Hydrologic Unit(s) (HUC):	HUC Name - HUC Number East Etiwanda Creek-Santa Ana River - 180702030804
The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site:	WBID Name - WBID Number Santa Ana River, Reach 3 - CAR8012100019990211140353
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	Bacterial Indicators - Pathogens Metals/Metalloids - Copper, Lead
Is the Site subject to Hydromodification:	Yes
Limitations on Infiltration:	Project Site Onsite Soils Group(s) - C Known Groundwater Contamination Plumes within 1000' - No Adjacent Water Supply Wells(s) - No information available please contact your local water agency for more information. Your local contact agency is JURUPA C.S.D.. Your local wholesaler contact agency is METROPOLITAN WATER DISTRICT.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None
Environmentally Sensitive Areas within 200'(CVMSHCP):	None
Environmentally Sensitive Areas within 200'(WRMSHCP):	Burrowing Owl Survey Required Area,Narrow Endemic Plants Survey Req. - Area 7

Groundwater elevation from Mean 775**Sea Level:**

**85th Percentile Design Storm
Depth (in):** 0.715

Groundwater Basin: Chino-East

**MSHCP/CVMSHCP Criteria Cell
(s):** No Data

Retention Ordinance Information: No Data

**Studies and Reports Related to
Project Site:** [IBI Scores - Southern Cal
bulletin118_4-sc
water_fact_3_7.11
8039-SAR-Hydromodification
final UWMP 051011
JCSD Master Water Plan 2005
Comprehensive Bacteria Reduction Plan
Jurupa-PyriteMPD
34th Annual Report Chino Basin Watermaster
2012 Annual Report of Santa Ana River](#)



NOAA Atlas 14, Volume 6, Version 2
Location name: Jurupa Valley, California, USA*
Latitude: 34.0051°, Longitude: -117.4479°
Elevation: 840.12 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

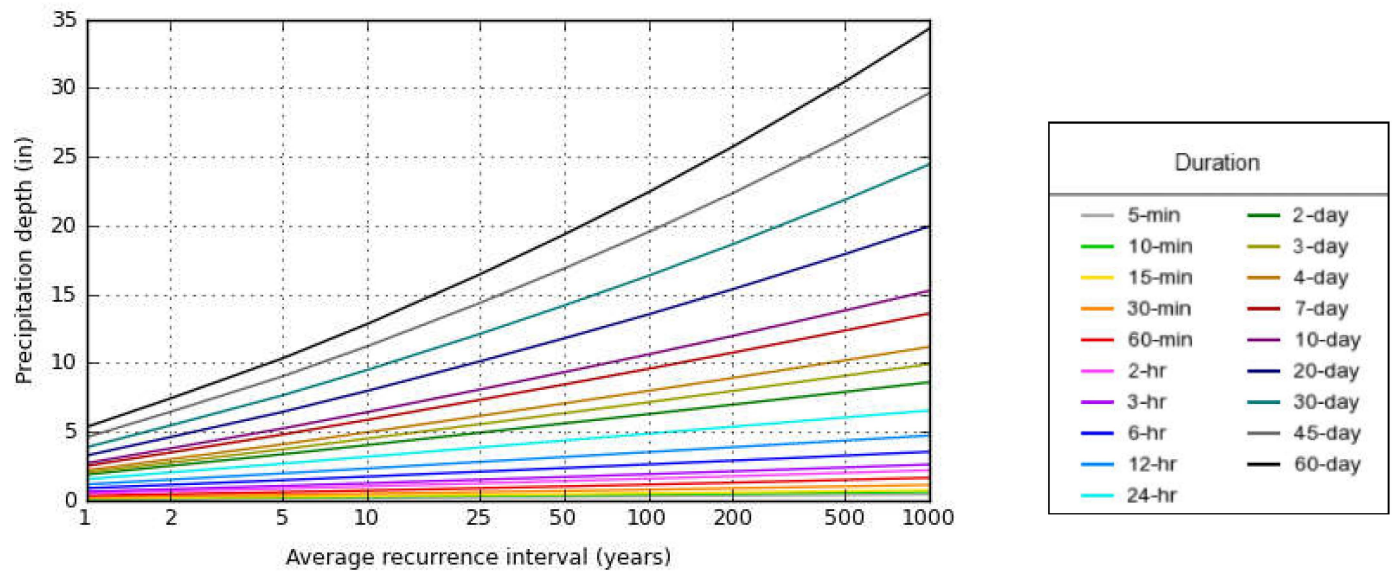
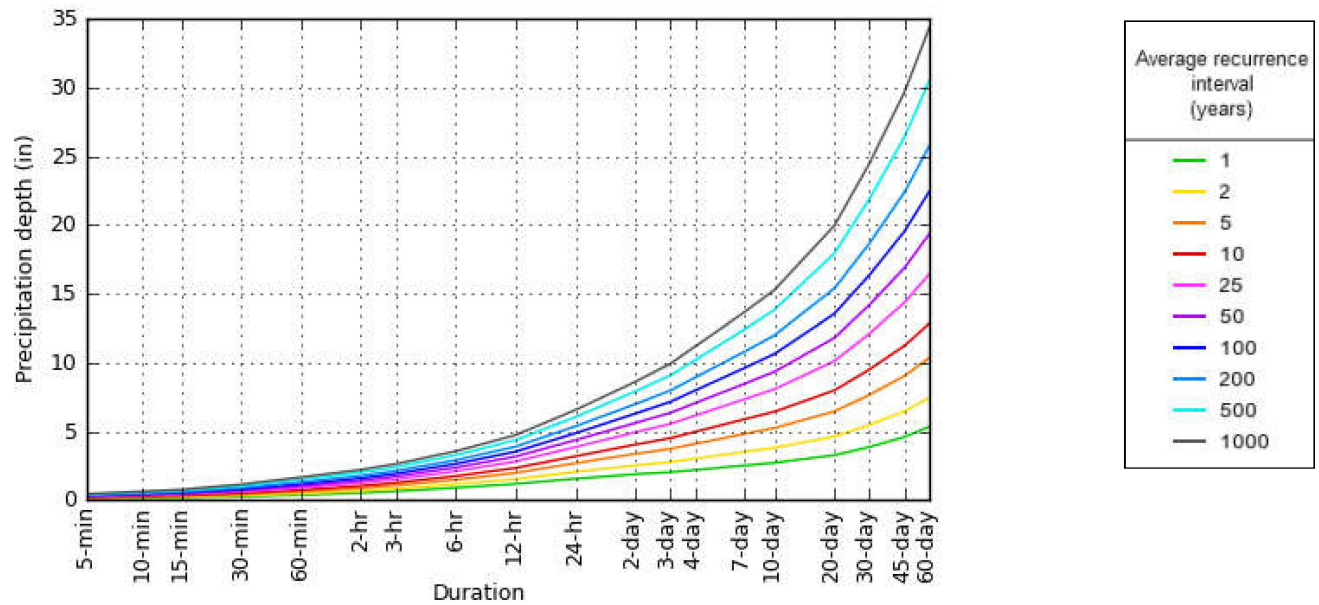
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.096 (0.080-0.117)	0.125 (0.104-0.151)	0.163 (0.135-0.198)	0.194 (0.160-0.238)	0.238 (0.190-0.302)	0.273 (0.212-0.354)	0.308 (0.234-0.410)	0.346 (0.255-0.474)	0.398 (0.281-0.570)	0.440 (0.300-0.653)
10-min	0.138 (0.115-0.167)	0.179 (0.149-0.217)	0.234 (0.194-0.284)	0.279 (0.230-0.342)	0.342 (0.272-0.434)	0.391 (0.304-0.507)	0.442 (0.335-0.588)	0.496 (0.366-0.680)	0.571 (0.403-0.817)	0.631 (0.430-0.936)
15-min	0.167 (0.139-0.202)	0.216 (0.180-0.262)	0.282 (0.235-0.343)	0.337 (0.278-0.413)	0.413 (0.329-0.524)	0.473 (0.368-0.613)	0.535 (0.406-0.712)	0.600 (0.442-0.822)	0.691 (0.488-0.988)	0.763 (0.520-1.13)
30-min	0.249 (0.208-0.302)	0.323 (0.269-0.392)	0.422 (0.350-0.513)	0.503 (0.415-0.617)	0.617 (0.491-0.783)	0.706 (0.550-0.916)	0.798 (0.606-1.06)	0.896 (0.660-1.23)	1.03 (0.728-1.48)	1.14 (0.777-1.69)
60-min	0.364 (0.303-0.440)	0.472 (0.393-0.572)	0.615 (0.511-0.748)	0.735 (0.605-0.901)	0.900 (0.716-1.14)	1.03 (0.802-1.34)	1.17 (0.884-1.55)	1.31 (0.963-1.79)	1.51 (1.06-2.15)	1.66 (1.13-2.47)
2-hr	0.527 (0.440-0.638)	0.678 (0.565-0.821)	0.875 (0.727-1.06)	1.03 (0.853-1.27)	1.25 (0.998-1.59)	1.42 (1.11-1.85)	1.60 (1.21-2.12)	1.77 (1.31-2.43)	2.02 (1.42-2.89)	2.21 (1.50-3.27)
3-hr	0.647 (0.540-0.783)	0.830 (0.692-1.01)	1.07 (0.887-1.30)	1.26 (1.04-1.55)	1.52 (1.21-1.93)	1.72 (1.34-2.23)	1.92 (1.46-2.56)	2.13 (1.57-2.92)	2.41 (1.70-3.45)	2.63 (1.79-3.90)
6-hr	0.897 (0.748-1.09)	1.15 (0.961-1.40)	1.48 (1.23-1.80)	1.75 (1.44-2.14)	2.10 (1.67-2.66)	2.37 (1.84-3.07)	2.63 (2.00-3.51)	2.91 (2.14-3.98)	3.27 (2.31-4.68)	3.55 (2.42-5.26)
12-hr	1.18 (0.981-1.42)	1.53 (1.27-1.85)	1.98 (1.64-2.40)	2.34 (1.92-2.86)	2.81 (2.24-3.57)	3.17 (2.47-4.11)	3.53 (2.68-4.69)	3.89 (2.87-5.33)	4.36 (3.08-6.24)	4.73 (3.22-7.01)
24-hr	1.55 (1.38-1.79)	2.05 (1.81-2.37)	2.68 (2.37-3.11)	3.19 (2.79-3.72)	3.86 (3.27-4.65)	4.36 (3.62-5.37)	4.87 (3.94-6.13)	5.37 (4.23-6.96)	6.05 (4.58-8.15)	6.56 (4.80-9.15)
2-day	1.88 (1.67-2.17)	2.53 (2.24-2.92)	3.37 (2.97-3.90)	4.04 (3.53-4.71)	4.93 (4.18-5.94)	5.61 (4.65-6.90)	6.29 (5.10-7.92)	6.98 (5.50-9.04)	7.90 (5.98-10.7)	8.61 (6.30-12.0)
3-day	2.03 (1.80-2.34)	2.77 (2.45-3.20)	3.73 (3.29-4.32)	4.51 (3.94-5.26)	5.55 (4.70-6.69)	6.35 (5.27-7.81)	7.15 (5.79-9.01)	7.97 (6.28-10.3)	9.08 (6.87-12.2)	9.93 (7.26-13.8)
4-day	2.19 (1.94-2.52)	3.01 (2.66-3.48)	4.09 (3.61-4.74)	4.97 (4.34-5.79)	6.15 (5.21-7.41)	7.06 (5.86-8.68)	7.98 (6.46-10.1)	8.92 (7.03-11.6)	10.2 (7.72-13.8)	11.2 (8.18-15.6)
7-day	2.51 (2.23-2.90)	3.50 (3.09-4.04)	4.80 (4.23-5.56)	5.87 (5.13-6.84)	7.32 (6.20-8.82)	8.44 (7.00-10.4)	9.58 (7.76-12.1)	10.8 (8.48-13.9)	12.4 (9.36-16.7)	13.6 (9.96-19.0)
10-day	2.71 (2.40-3.13)	3.80 (3.36-4.38)	5.24 (4.62-6.07)	6.43 (5.62-7.50)	8.06 (6.83-9.72)	9.33 (7.74-11.5)	10.6 (8.61-13.4)	12.0 (9.44-15.5)	13.8 (10.5-18.6)	15.3 (11.2-21.3)
20-day	3.27 (2.89-3.77)	4.62 (4.08-5.33)	6.45 (5.69-7.46)	7.98 (6.98-9.30)	10.1 (8.56-12.2)	11.8 (9.78-14.5)	13.5 (11.0-17.1)	15.4 (12.1-19.9)	17.9 (13.6-24.2)	19.9 (14.6-27.8)
30-day	3.86 (3.42-4.45)	5.46 (4.83-6.31)	7.65 (6.75-8.86)	9.50 (8.31-11.1)	12.1 (10.2-14.6)	14.2 (11.8-17.4)	16.3 (13.2-20.6)	18.6 (14.7-24.1)	21.9 (16.6-29.5)	24.5 (17.9-34.1)
45-day	4.59 (4.06-5.29)	6.46 (5.71-7.45)	9.03 (7.96-10.5)	11.2 (9.81-13.1)	14.3 (12.1-17.3)	16.9 (14.0-20.7)	19.5 (15.8-24.6)	22.4 (17.6-29.0)	26.4 (20.0-35.6)	29.6 (21.7-41.3)
60-day	5.34 (4.72-6.15)	7.43 (6.57-8.58)	10.3 (9.12-12.0)	12.8 (11.2-15.0)	16.4 (13.9-19.8)	19.3 (16.0-23.8)	22.4 (18.2-28.2)	25.7 (20.3-33.3)	30.5 (23.1-41.1)	34.3 (25.1-47.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

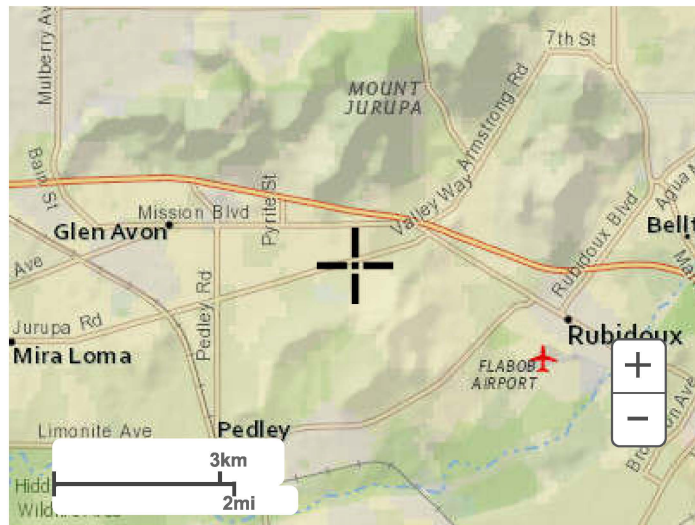
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.0051°, Longitude: -117.4479°



Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



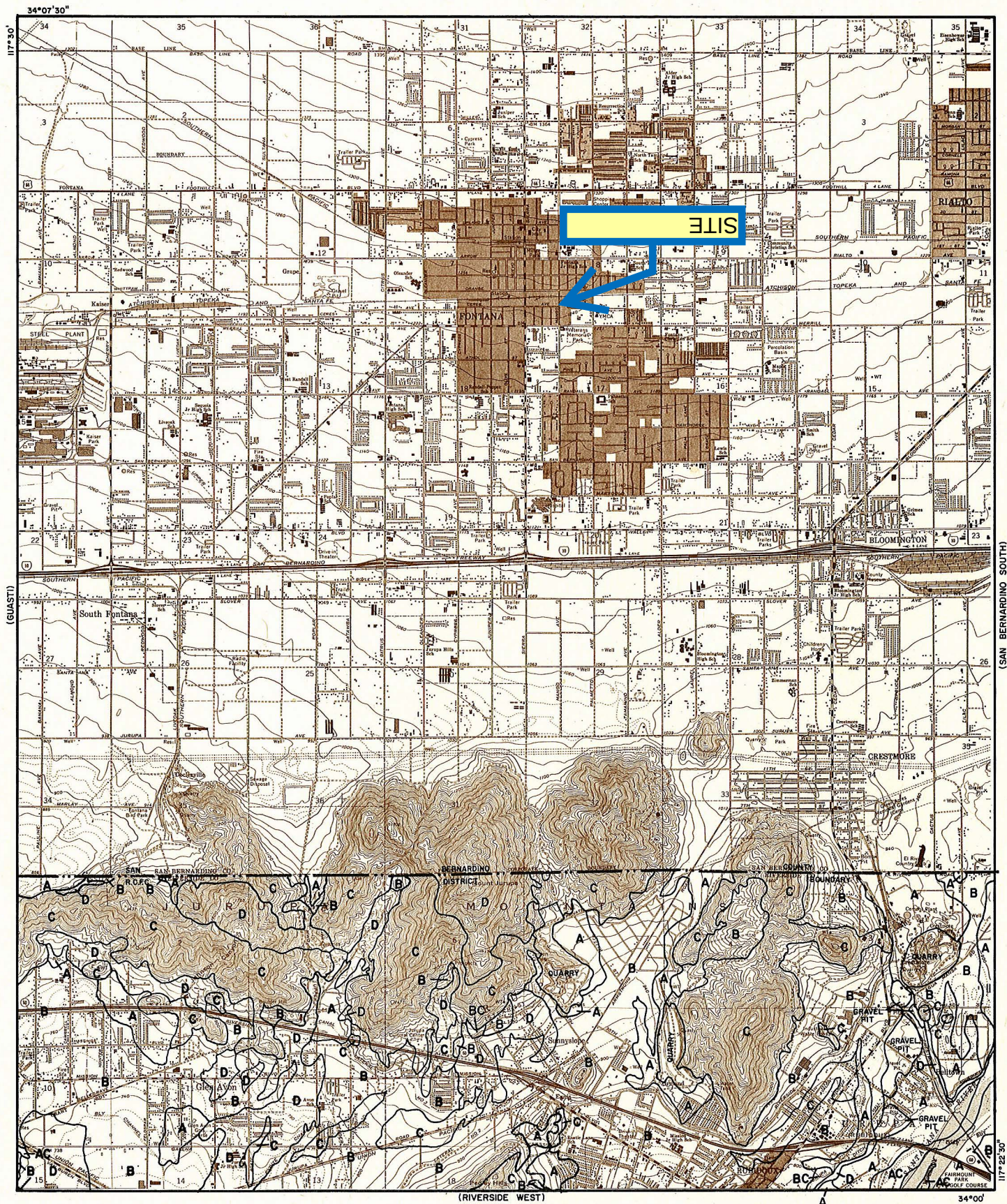
Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

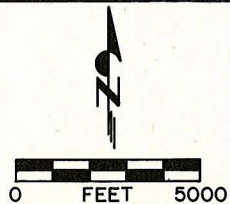
[Disclaimer](#)



LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC & WCD
HYDROLOGY MANUAL



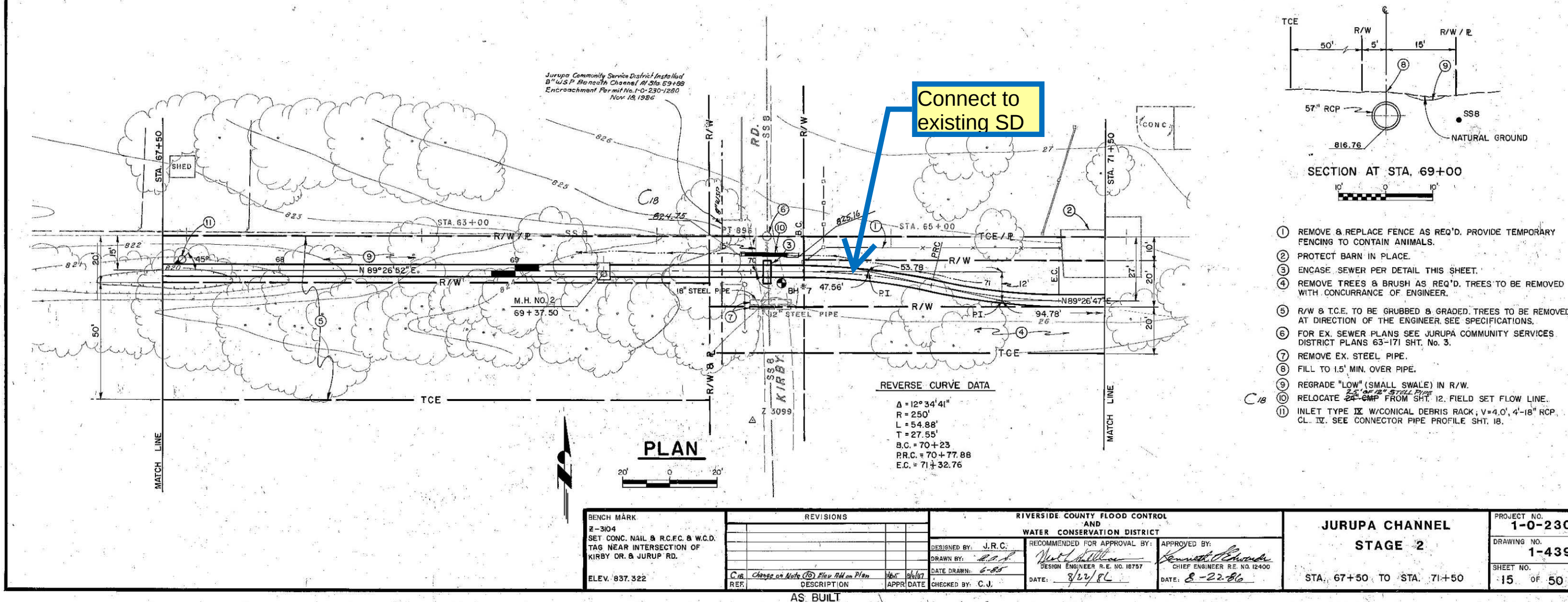
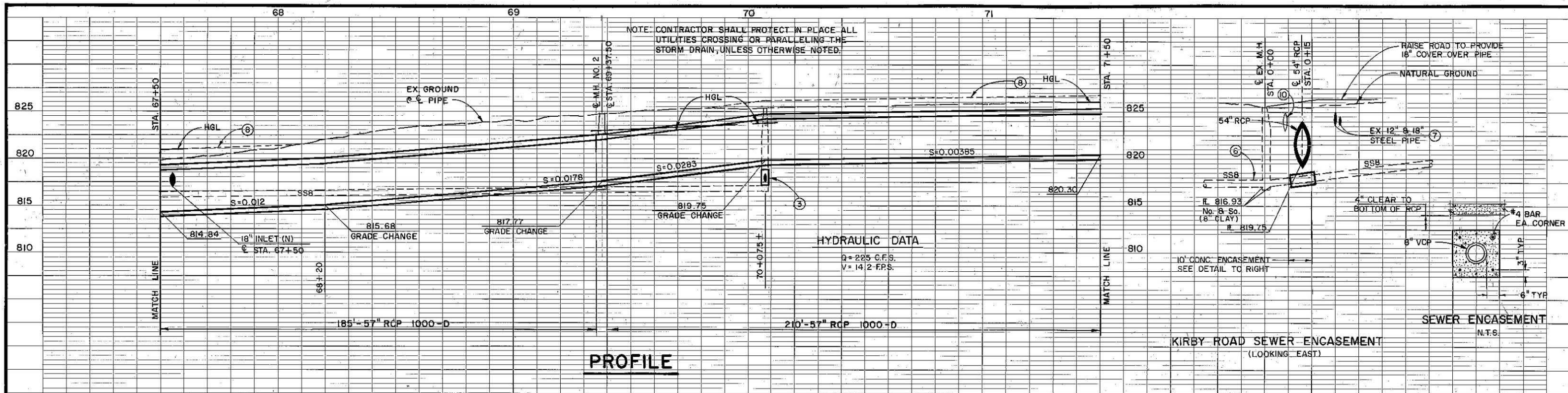
HYDROLOGIC SOILS GROUP MAP FOR FONTANA

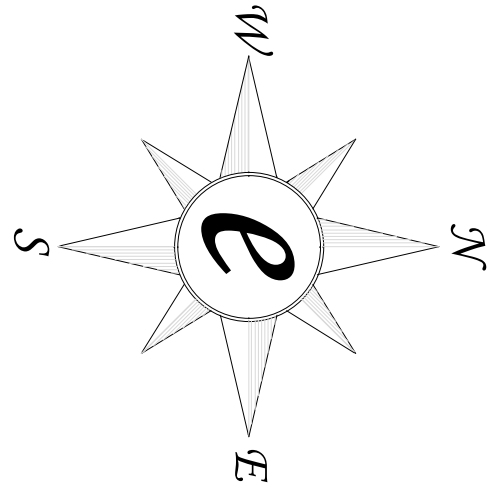
RIVERSIDE COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT
RIVERSIDE, CALIFORNIA

REPORT ON
MASTER DRAINAGE PLAN
FOR
THE JURUPA - PYRITE AREA
ZONE ONE

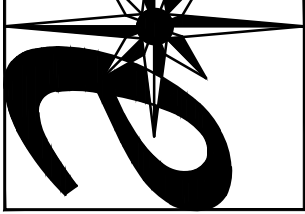
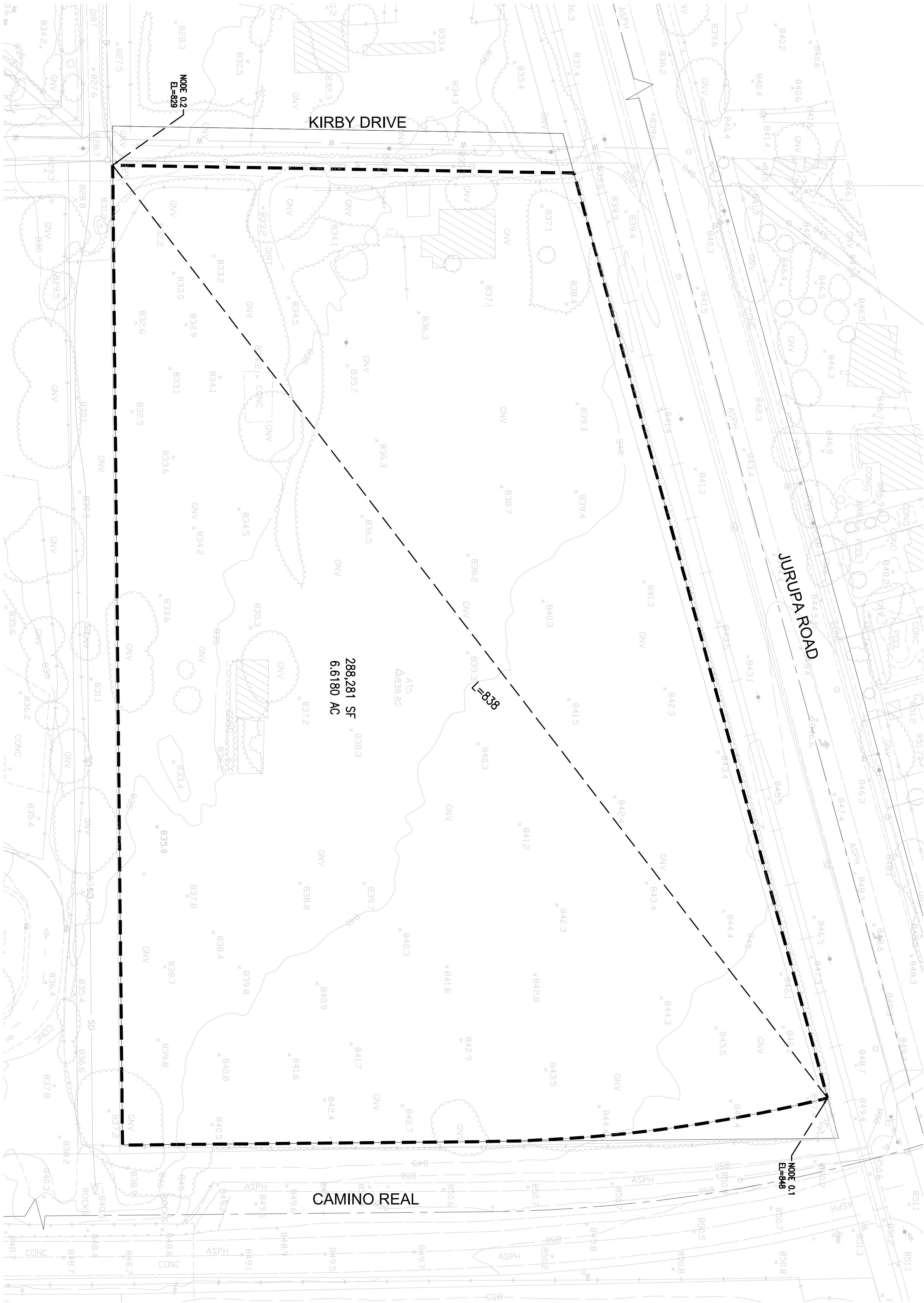
NOVEMBER 1971

JOHN W. BRYANT
Chief Engineer





SCALE: 1:40

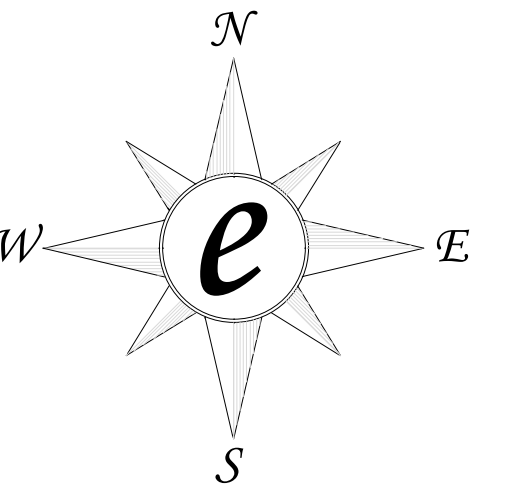


ENCOMPASS ASSOCIATES, INC.

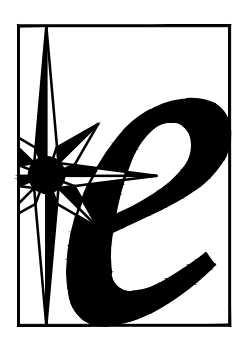
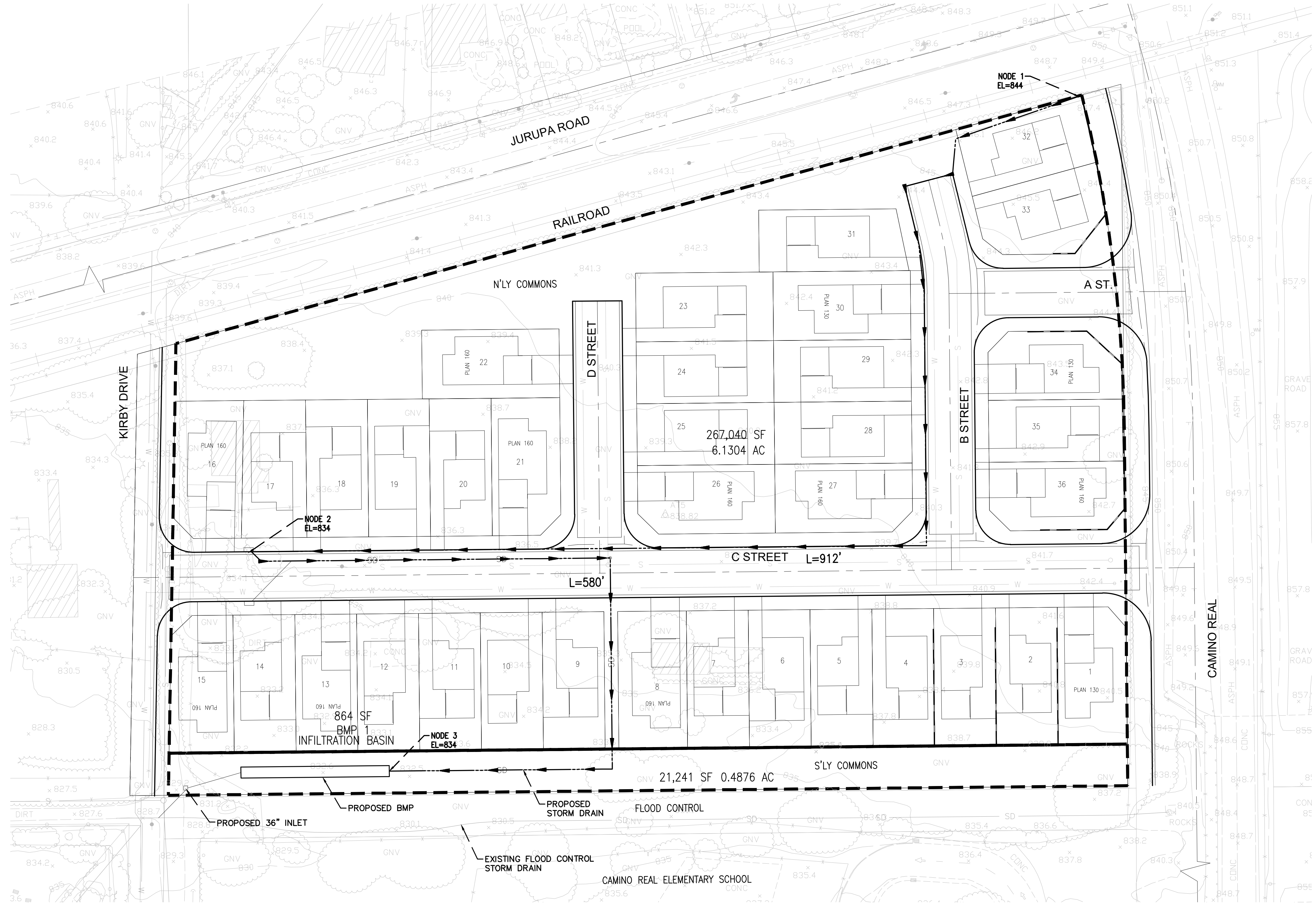
Existing Condition Hydrology Map

TRACT 38151

CAMINO REAL, JURUPA VALLEY



SCALE: 1:40



ENCOMPASS ASSOCIATES, INC.

Developed Condition Hydrology Map
TRACT 38151
CAMINO REAL, JURUPA VALLEY