Preliminary Drainage Report

FOR:

Tentative Tract No. 37558
(APN 439-230-005)

IN THE CITY OF HEMET
RIVERSIDE COUNTY

FOR OWNER:

Mr. Shizao Zheng
1378 West Zhorgshan Road,
Ningbo City, Zhejiang Province, China

PREPARED BY:

SIKAND ENGINEERING ASSOCIATES
15230 Burbank Boulevard, Suite 100
Van Nuys, California 91411
818-787-8550

Doug Farmer, Civil Engineer

W.O. 5118-007
Submittal Date: 01-27-2020

TABLE OF CONTENTS

SECTION 1

NARRATIVE

CERTIFICATION:

"I hereby certify that this report (plan) for the Preliminary Drainage design of Tentative Tract 37558 was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Hemet Storm Drain Development Standards, Storm Drain Criteria and Drainage Design Manual for the owners thereof. I understand that the City of Hemet does not and will not assume liability for drainage facilities designed by others."

_____

Registered Professional Engineer

State of California No. _____

(Affix Seal)

I. NARRATIVE

A. Introduction

This report shows the results of the preliminary drainage analysis for the proposed single-family residential development, Tentative Tract 37558, located at 800 N. Girard Street in the City of Hemet, County of Riverside, California. The site is at the northwest corner of the intersection of Park Avenue and Menlo Avenue, see Vicinity Map on Section 2. The purpose of this analysis is to compare the storm event conditions of the onsite Pre-Development versus the Post-Development, to comply with the drainage requirements established by the City of Hemet, and to provide the criteria for the design of the on-site storm drain systems and other related drainage devices.

B. Scope of Project

The proposed development is a zone change from a Two Family Residential into a Single Family Residential, transforming the site into a Tract Subdivision with 51 Single Family Residential lots and two lettered lots for future development. The development includes about 2100 feet of 60'-wide roads, with 4 culdesacs, and entrances/exits at the northwest corner of the site, along Girard Street, and at the middle of the south boundary along Menlo Avenue. A retention/detention basin with access ramp and spillway (also a water quality basin under a separate submittal, P-WQMP) is proposed to mitigate the drainage impacts of the development. A storm drain system located along the west site boundary is proposed to bring the storm runoff into the proposed basin. Another storm drain line is proposed to connect the existing catch basin and pipe outlet along the middle east boundary, along Park Avenue, and convey its offsite runoff across the site and into the proposed parkway drain along Menlo Park. Also, a number of retaining walls area spread out across the siteto help maintain setback requirements, see Proposed Condition Hydrology Map on Section 4.

C. Site Description

The project site is bounded by the Girard Street along the west boundary, by Park Avenue along the east boundary, by Menlo Avenue along the south boundary, by existing residential developments on the north and on the southwest area. The current existing condition of the site is an undeveloped vacant property, with various small concrete structures, and that the

soil has a fair cover of shrubs and weeds vegetation. The site topography is moderately sloped from southeast to northwest, with elevations ranging from high of 1637 feet to low of 1606 feet. An existing catch basin and outlet pipe located at the east boundary along Park Avenue brings offsite runoff from a small tributary area coming from the hill and Park Avenue into the site. The site naturally drains into the northwest corner of site, and into the Girard Street towards north. At about a distance of 200 feet, it crosses a vacant property from southeast to northwest and into the existing catch basins of existing San Jacinto MDP Line B (Stage 1) along S. San Jacinto Avenue, just before the intersection with Midway Street. This storm drain system eventually drains into the Buena Vista Basin.

II. SYSTEM SCHEMATIC

A. Proposed Surface Improvements

See Proposed Condition Hydrology Map (Section 4).

B. Proposed Flood Control Facilities

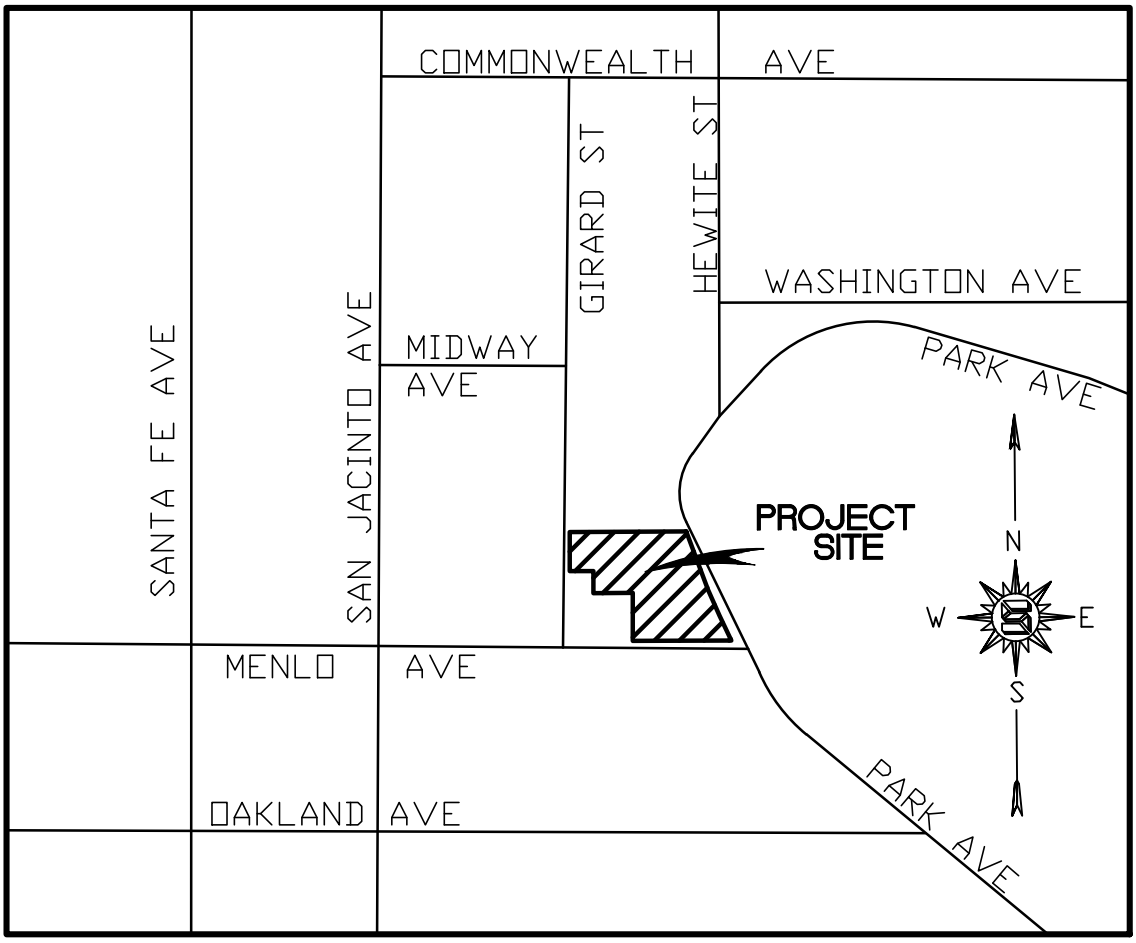
See Proposed Condition Hydrology Map (Section 4) and Retention/Detention Basin Exhibit (Section 6)

III. PRELIMINARY DRAINAGE SUMMARY

The preliminary onsite drainage analysis shows a 100-year storm peak discharge (Q100) of 31.6 cfs for proposed condition development versus 23.5 cfs for existing condition. To mitigate this increase in Q, the proposed retention/detention basin is provided with a retention capacity of 35,018 cu-ft and an additional detention capacity of 4,101 cu-ft, for a total basin storage capacity of 39,119 cu-ft. This basin capacity handles about 78% of the proposed condition 100-year, 3-hour flood volume (see Section 5, Hydrograph Calculation, Shortcut Method), while releasing a post-development, post-retention/detention Q100 of 2.7 cfs. This volume and discharge reduction shows that the proposed development has no drainage impact on its downstream receiving areas.

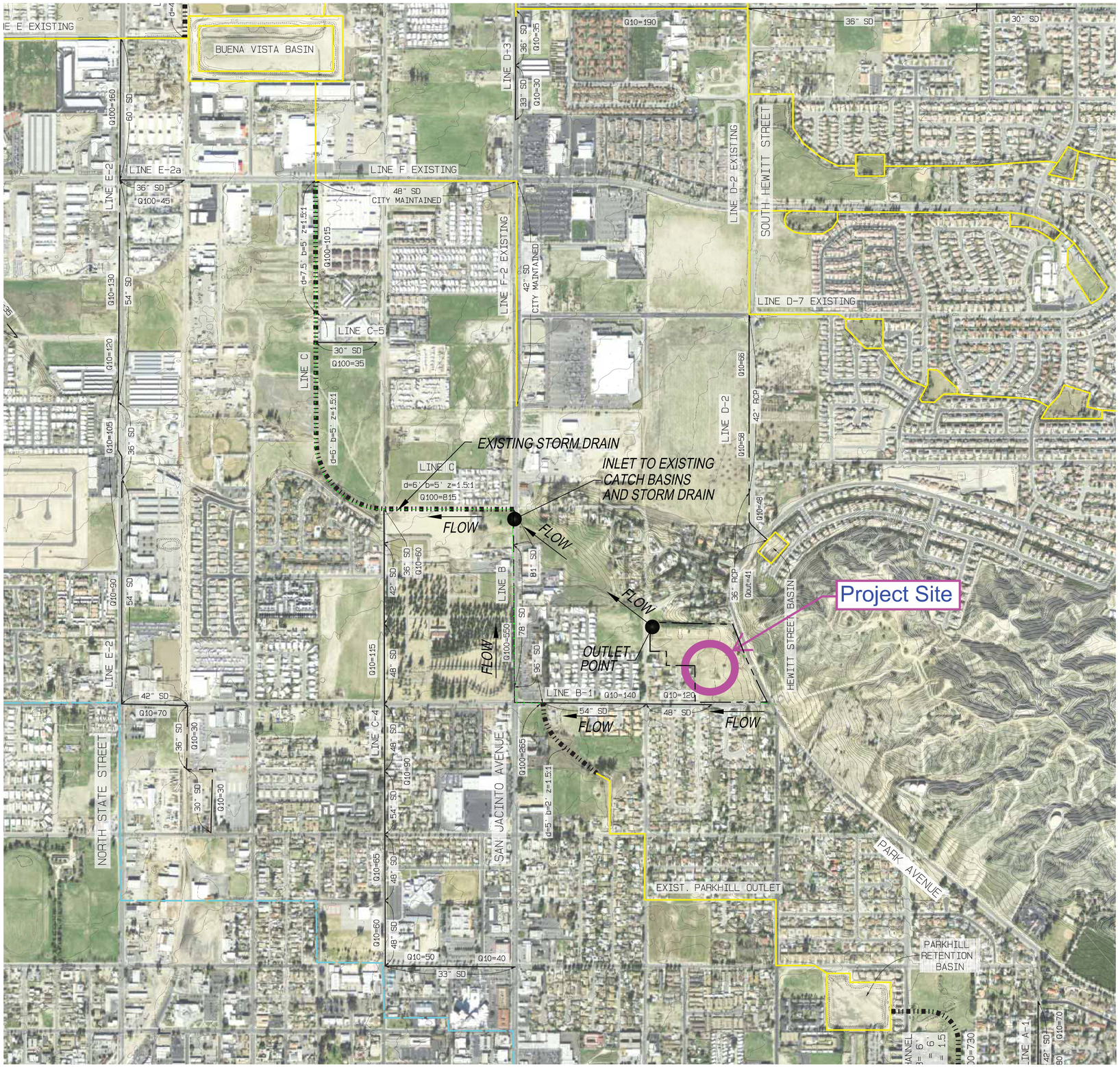
SECTION 2

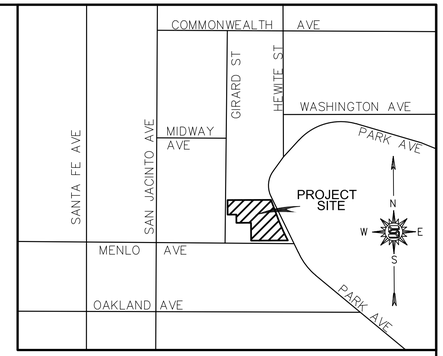
HYDROLOGIC INFORMATION



VICINITY MAP

NOT TO SCALE





VICINITY MAP
NOT TO SCALE

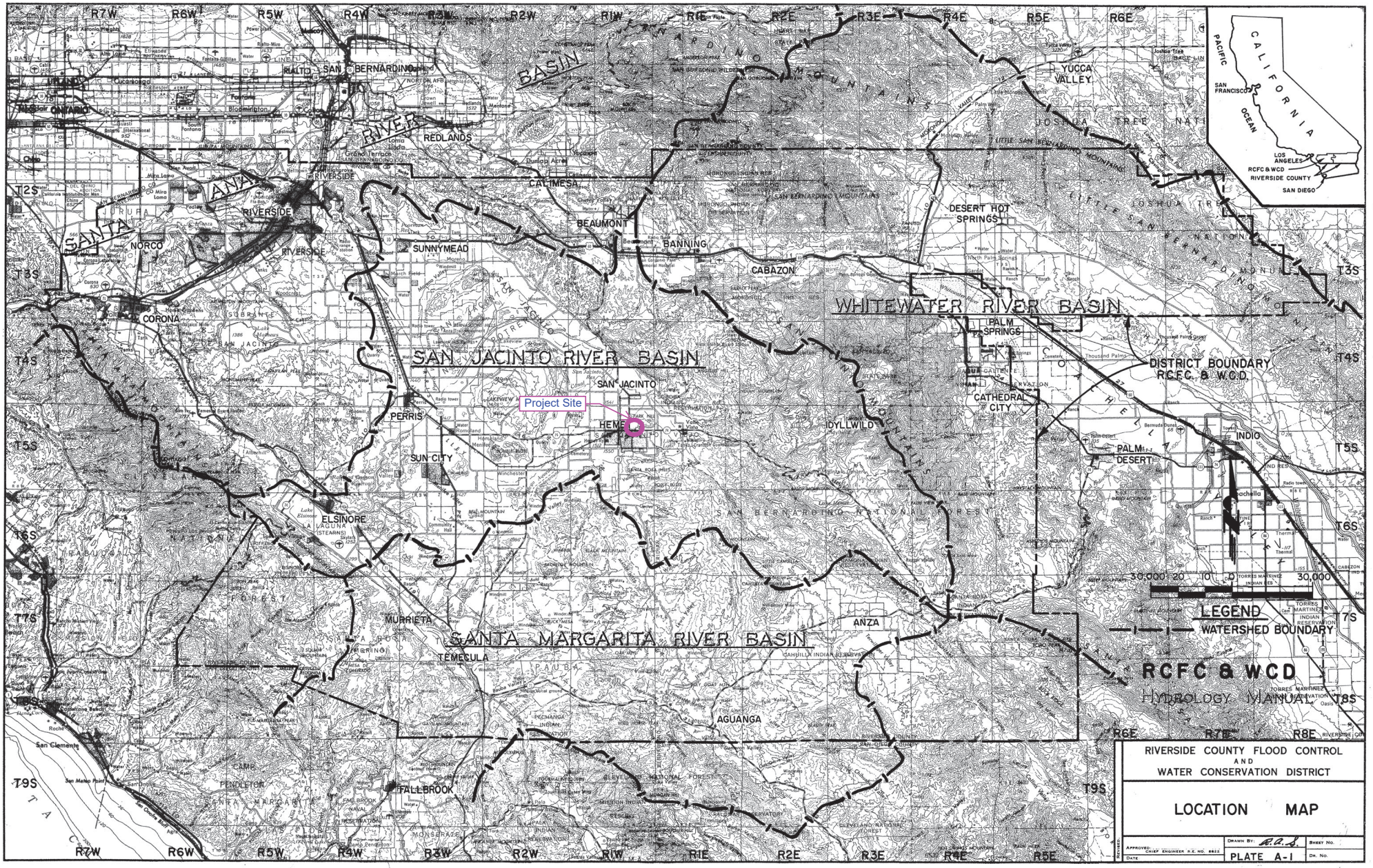
GENERAL LOCATION MAP

(MAP FROM RCFCWCD MASTER DRAINAGE PLAN FOR JACINTO VALLEY ZONE 4)

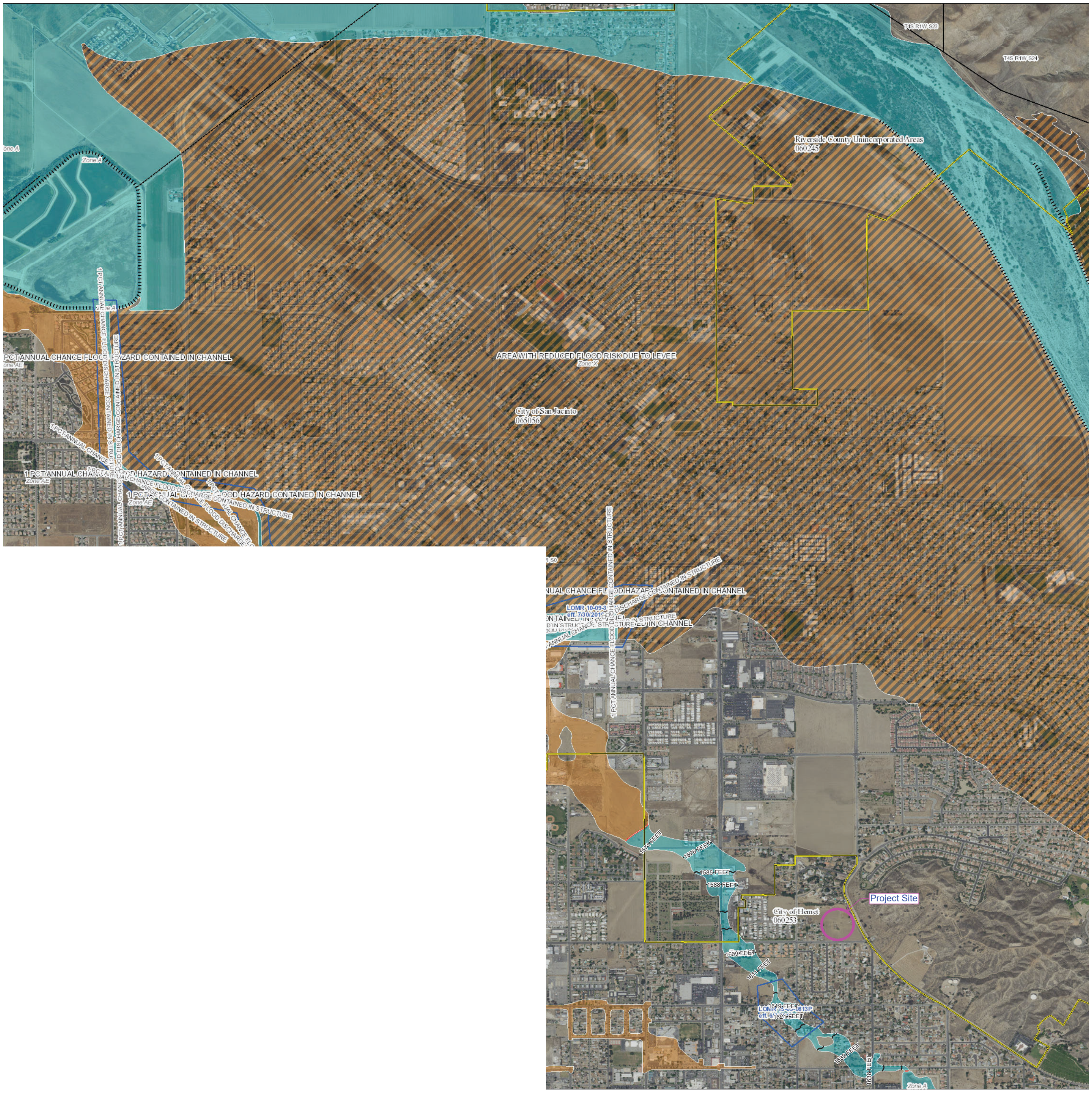
NORTH

SCALE: 1"=500'

SHEET 1 OF 1 SHEET


Project Site
SAN JACINTO RIVER BASIN
WHITEWATER RIVER BASIN
SANTA MARGARITA RIVER BASIN
SANTA ANA RIVER BASIN
DISTRICT BOUNDARY
R.C.F.C. & W.C.D.
LEGEND
WATERSHED BOUNDARY
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
LOCATION MAP
PLATE A-1
CALIFORNIA
PACIFIC OCEAN
SAN FRANCISCO
LOS ANGELES
RCFC & WCD
RIVERSIDE COUNTY
SAN DIEGO
30,000 20 10 0 30,000

33°48'58.33"N



USGS The National Map: Orthoimagery. Data refreshed April, 2019.

33°44'46.70"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99* With BFE or Depth *Zone AE, AO, AH, VE, AR* Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X* Future Conditions 1% Annual Chance Flood Hazard *Zone X* Area with Reduced Flood Risk due to Levee See Notes. *Zone X* Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X* Effective LOMRs Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
OTHER FEATURES	20.2 Cross Sections with 1% Annual Chance 17.5 Water Surface Elevation Coastal Transect Coastal Transect Baseline Profile Baseline Hydrographic Feature 513 Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can beordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **1/22/2020 5:00:17 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

ATTENTION: The levee, dike, or other structure that impacts flood hazards inside this boundary has not been shown to comply with Section 65.10 of the NFIP Regulations. As such, this FIRM panel will be revised at a later date to update the flood hazard information associated with this structure. The flood hazard data inside this boundary on the FIRM panel has been republished from the previous effective (historic) FIRM for this area, after being converted from NGVD 29 to NAVD 88.

SCALE

N

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88

For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map please see the Flood Insurance Study(FIS) Report for your community at https://msc.fema.gov

1 inch = 1,000 feet 1:12,000

Feet: 0 500 1,000 2,000 3,000 4,000

Meters: 0 105 210 420 630 840

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA AND INCORPORATED AREAS

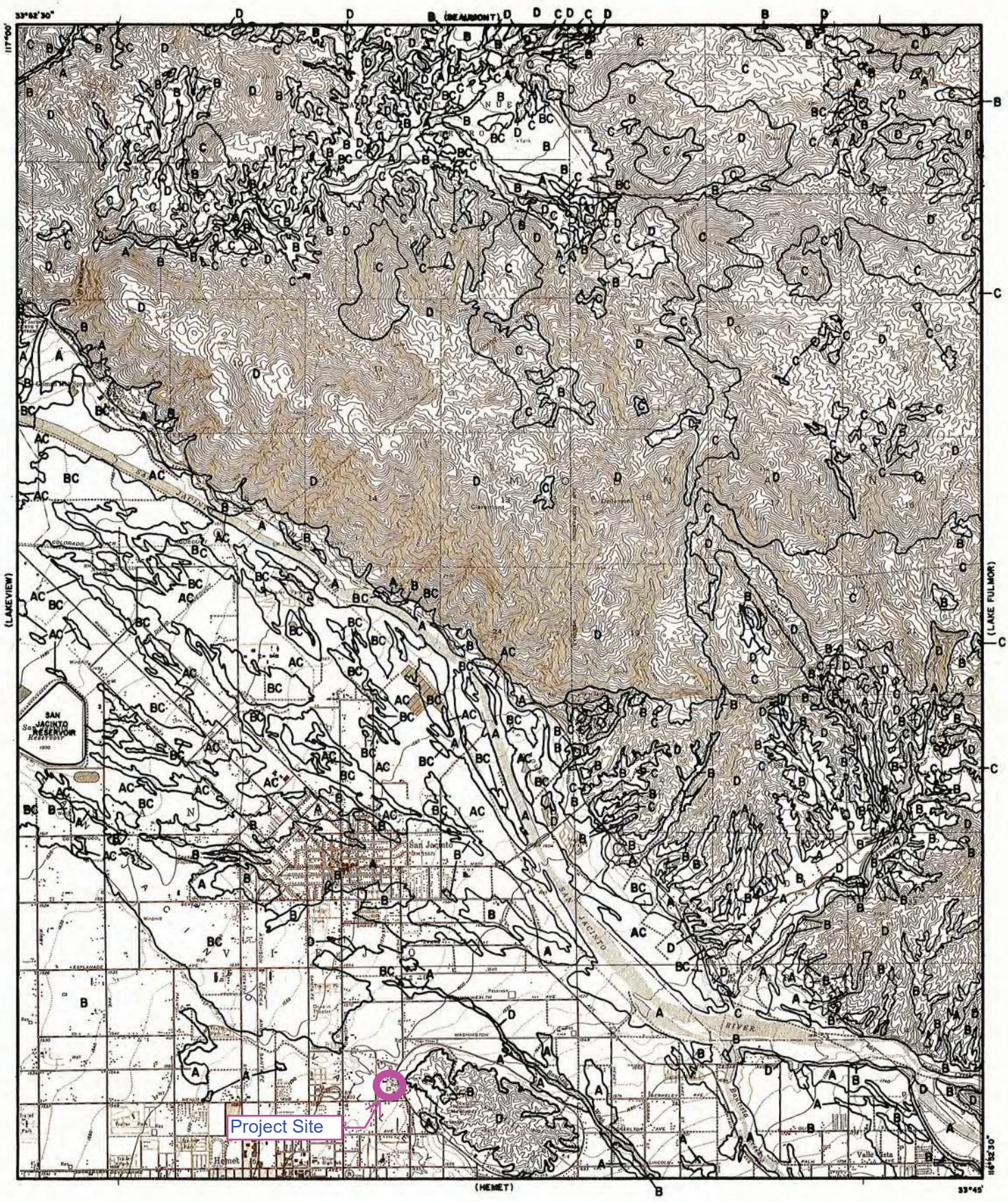
PANEL 1490 OF 3805

Panel Contains:

COMMUNITY	NUMBER	PANEL
RIVERSIDE COUNTY UNINCORPORATED AREAS CALIFORNIA	060245	1490
CITY OF HEMET CALIFORNIA	060253	1490
CITY OF SAN JACINTO CALIFORNIA	065056	1490

MAP NUMBER
06065C1490H

EFFECTIVE DATE
04/19/2017



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

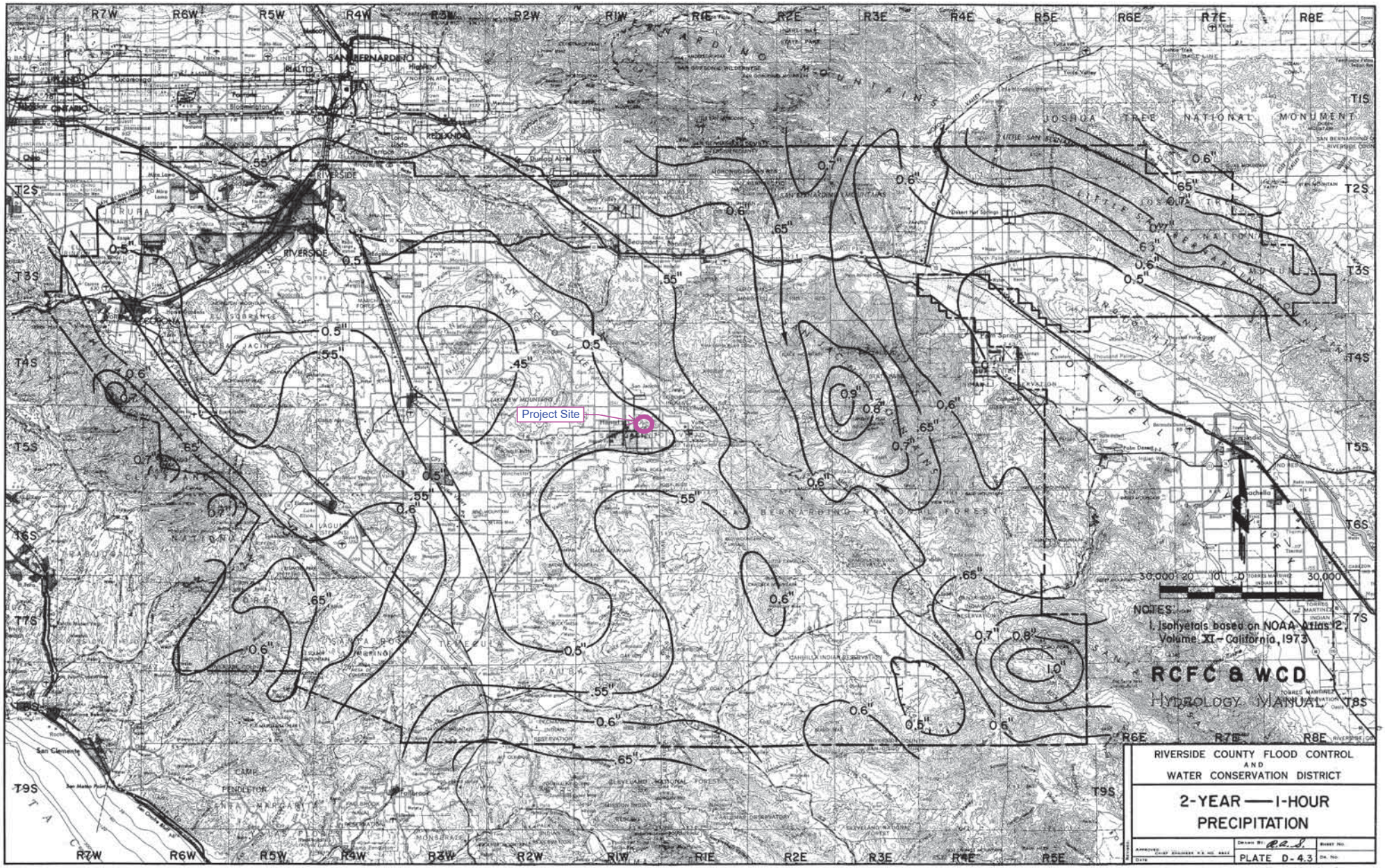
RCFC & WCD

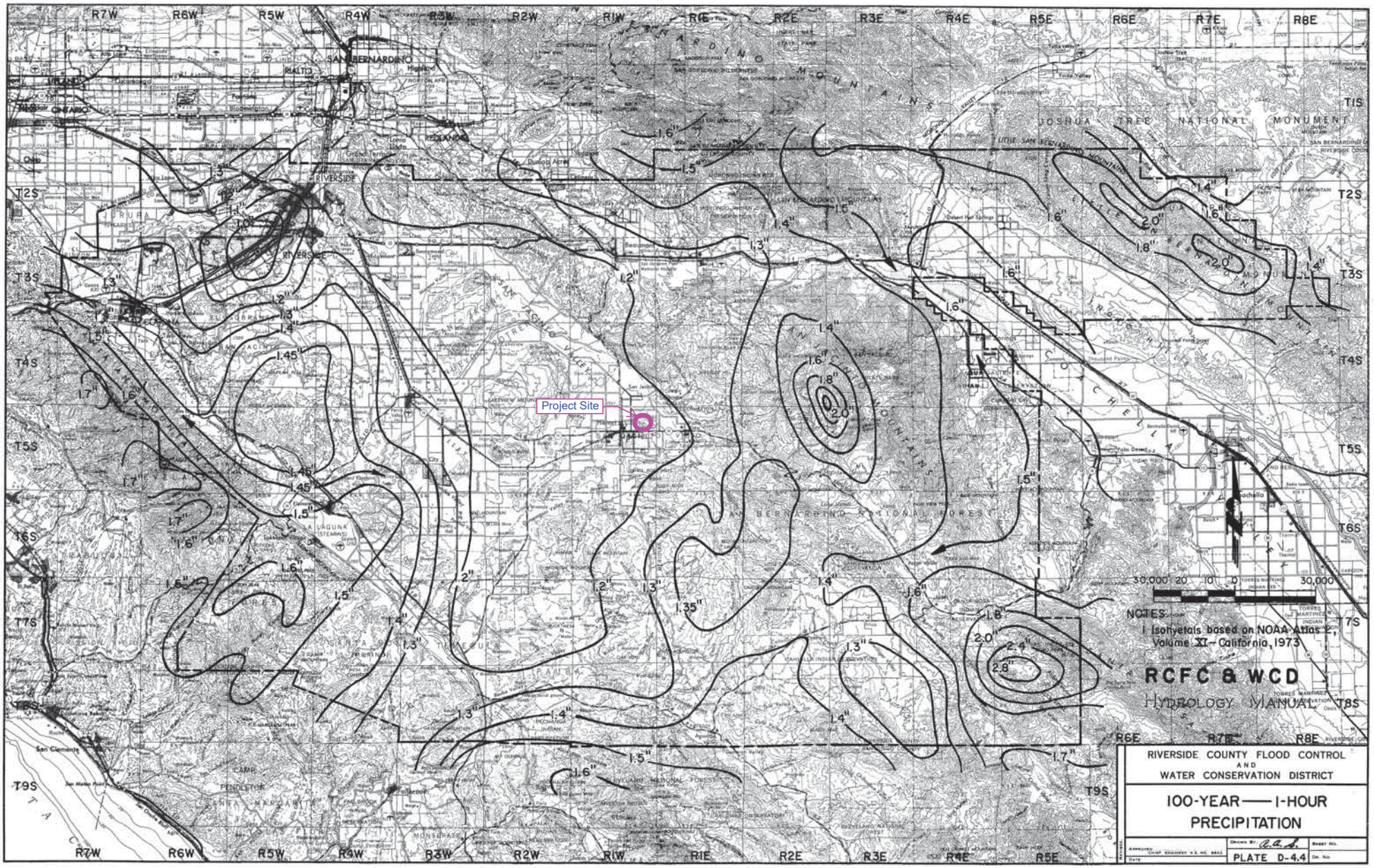
HYDROLOGY MANUAL

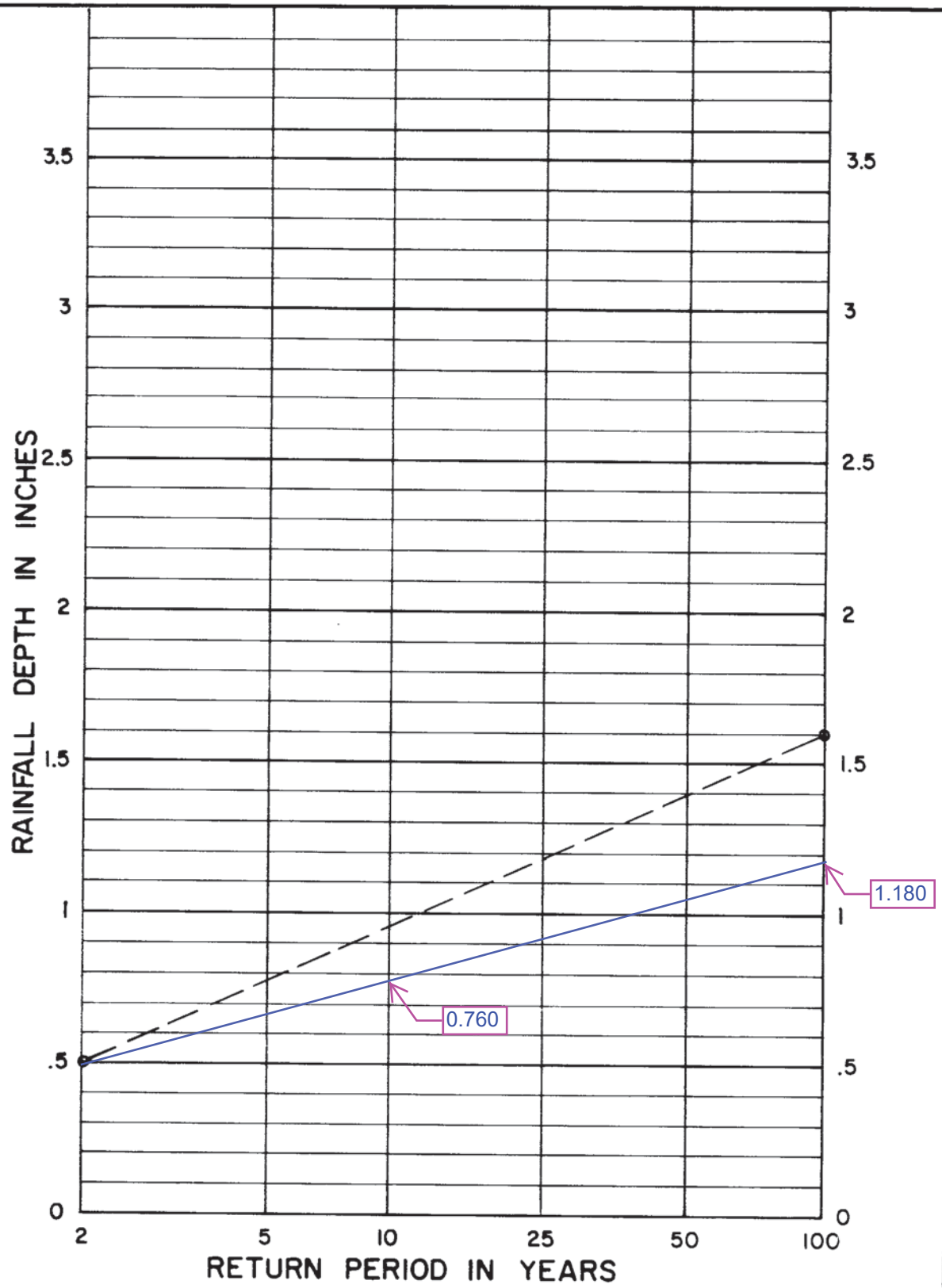
0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR SAN JACINTO

PLATE C-1.32


Project Site
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.3


Project Site
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.4



NOTE:

1. For intermediate return periods plot 2-year and 100-year one hour values from maps, then connect points and read value for desired return period. For example given 2-year one hour = .50" and 100-year one hour = 1.60", 25-year one hour = 1.18"

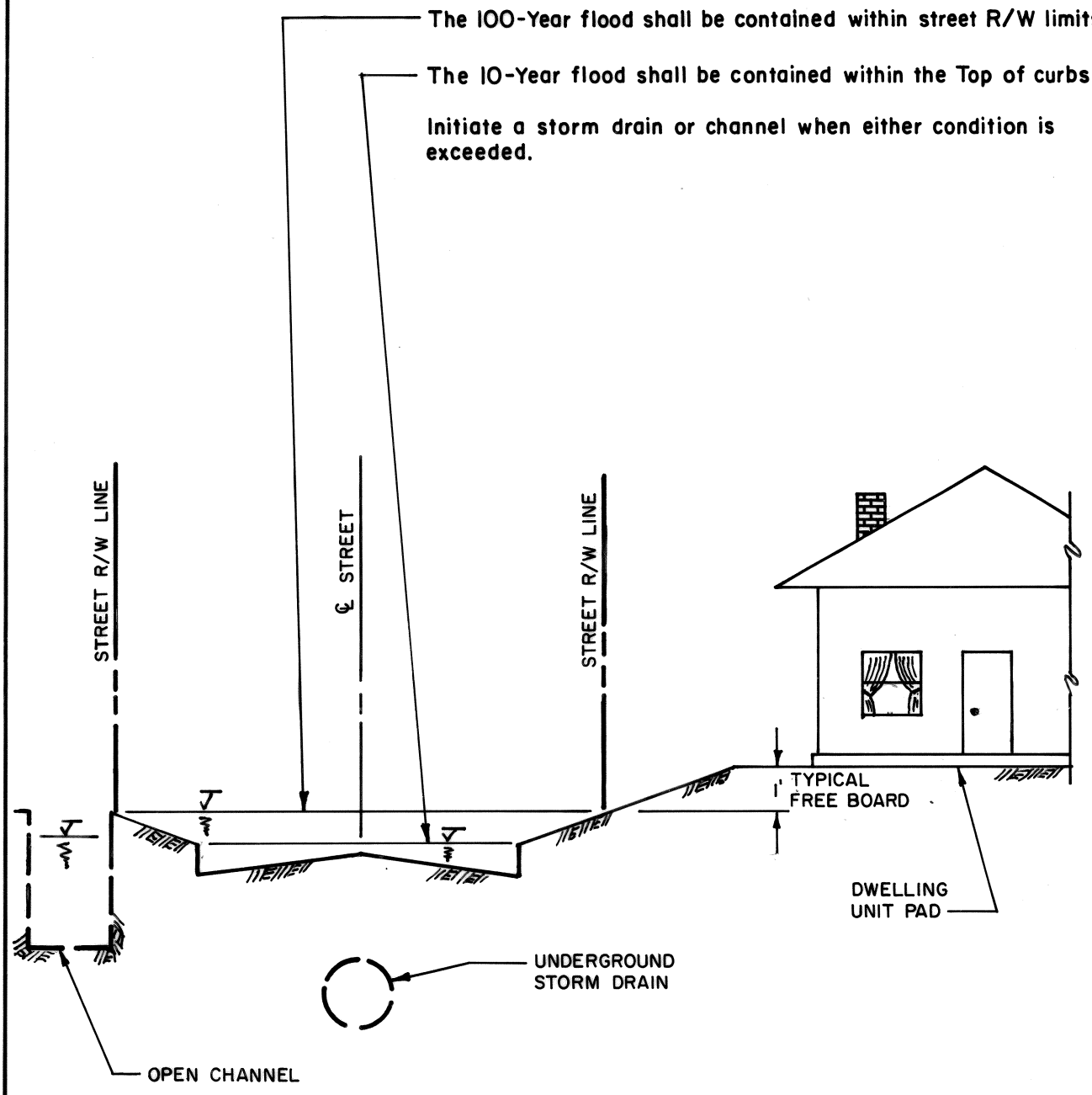
Reference: NOAA Atlas 2, Volume XI-California, 1973.

RCFC & WCD

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

PLATE D-4.5



NOTES:

Protection criteria shown are the Districts typical minimum requirments. Special conditions, or other authorities may require stricter controls; ie; for reasons of traffic or pedestrian safety, maintenance problems behind curbs, etc., lower maximum depths of flow in streets may be required. Also see Riv. Co. Ord. No. 460.

RCFC & WCD

HYDROLOGY MANUAL

FLOOD PROTECTION CRITERIA

PLATE A-2

RAINFALL PATTERNS IN PERCENT

3-HOUR STORM

TIME PERIOD	5-MIN PERIOD	10-MIN PERIOD	15-MIN PERIOD	30-MIN PERIOD
1	1.3	2.6	3.7	8.5
2	1.3	2.6	4.8	10.0
3	1.1	3.3	5.1	13.9
4	1.5	3.3	4.9	17.4
5	1.5	3.3	6.6	29.9
6	1.8	3.4	7.3	20.3
7	1.5	4.4	8.4	
8	1.8	4.2	9.0	
9	1.8	5.3	12.3	
10	1.5	5.1	17.6	
11	1.6	6.4	16.1	
12	1.8	5.9	4.2	
13	2.2	7.3		
14	2.2	8.5		
15	2.2	14.1		
16	2.0	14.1		
17	2.6	3.8		
18	2.7	2.4		
19	2.4			
20	2.7			
21	3.3			
22	3.1			
23	2.9			
24	3.0			
25	3.1			
26	4.2			
27	5.0			
28	3.5			
29	6.8			
30	7.3			
31	8.2			
32	5.9			
33	2.0			
34	1.8			
35	1.8			
36	.6			

6-HOUR STORM

TIME PERIOD	5-MIN PERIOD	10-MIN PERIOD	15-MIN PERIOD	30-MIN PERIOD
1	.5	1.1	1.7	3.6
2	.6	1.2	1.9	4.3
3	.6	1.3	2.1	4.8
4	.6	1.4	2.2	4.9
5	.6	1.4	2.4	5.3
6	.7	1.5	2.4	5.8
7	.7	1.6	2.4	6.8
8	.7	1.6	2.5	9.0
9	.7	1.6	2.6	11.6
10	.7	1.6	2.7	14.4
11	.7	1.6	2.8	25.1
12	.8	1.7	3.0	4.4
13	.8	1.7	3.2	
14	.8	1.8	3.6	
15	.8	1.8	4.3	
16	.8	1.8	4.7	
17	.8	2.0	5.4	
18	.8	2.0	6.2	
19	.8	2.1	6.9	
20	.8	2.2	7.5	
21	.8	2.5	10.6	
22	.8	2.8	14.5	
23	.8	3.0	3.4	
24	.9	3.2	1.0	
25	.8	3.5		
26	.9	3.9		
27	.9	4.2		
28	.9	4.5		
29	.9	4.8		
30	.9	5.1		
31	.9	6.7		
32	.9	8.1		
33	1.0	10.3		
34	1.0	2.8		
35	1.0	1.1		
36	1.0	.5		
37	1.0			
38	1.1			
39	1.1			
40	1.1			
41	1.2			
42	1.3			
43	1.4			
44	1.4			
45	1.5			
46	1.5			
47	1.6			
48	1.6			

TIME PERIOD	5-MIN PERIOD
49	1.7
50	1.8
51	1.9
52	2.0
53	2.1
54	2.1
55	2.2
56	2.3
57	2.4
58	2.4
59	2.5
60	2.6
61	3.1
62	3.6
63	3.9
64	4.2
65	4.7
66	5.6
67	1.9
68	.9
69	.6
70	.5
71	.3
72	.2

24-HOUR STORM

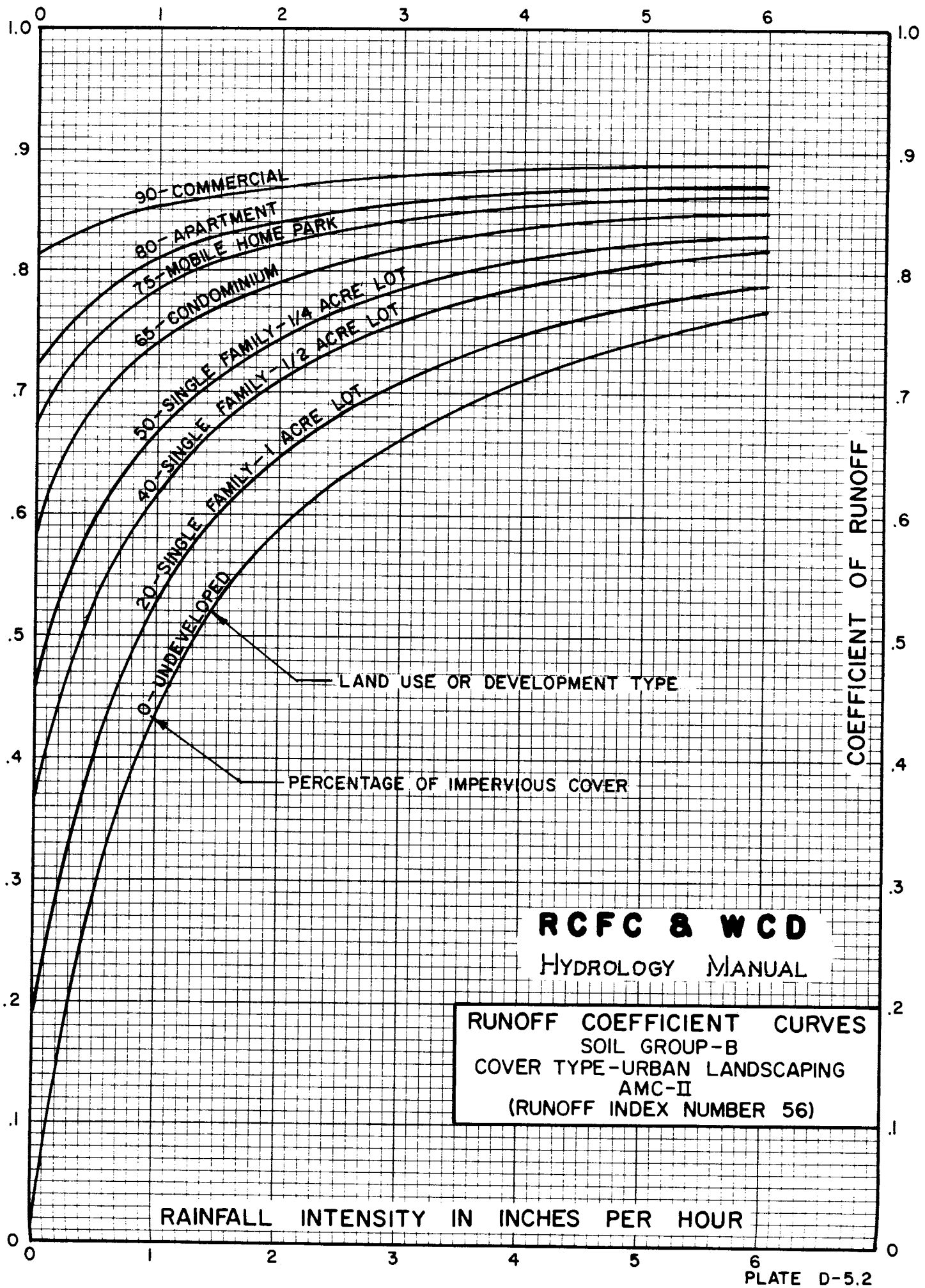
TIME PERIOD	15-MIN PERIOD	30-MIN PERIOD	60-MIN PERIOD
1	.2	.5	1.2
2	.3	.7	1.3
3	.3	.6	1.8
4	.4	.7	2.1
5	.3	.8	2.8
6	.3	1.0	2.9
7	.3	1.0	3.8
8	.4	1.1	4.6
9	.4	1.3	6.3
10	.4	1.5	8.2
11	.5	1.3	7.0
12	.5	1.6	7.3
13	.5	1.8	10.8
14	.5	2.0	11.4
15	.5	2.1	10.4
16	.6	2.5	8.5
17	.6	3.0	1.4
18	.7	3.3	1.9
19	.7	3.9	1.3
20	.8	4.3	1.2
21	.6	3.0	1.1
22	.7	4.0	1.0
23	.8	3.8	.9
24	.8	3.5	.8
25	.9	5.1	
26	.9	5.7	
27	1.0	6.8	
28	1.0	4.6	
29	1.0	5.3	
30	1.1	5.1	
31	1.2	4.7	
32	1.3	3.8	
33	1.5	.8	
34	1.5	.6	
35	1.6	1.0	
36	1.7	.9	
37	1.9	.8	
38	2.0	.5	
39	2.1	.7	
40	2.2	.5	
41	1.5	.6	
42	1.5	.5	
43	2.0	.5	
44	2.0	.5	
45	1.9	.5	
46	1.9	.4	
47	1.7	.4	
48	1.8	.4	

TIME PERIOD	15-MIN PERIOD
49	2.5
50	2.6
51	2.8
52	2.9
53	3.4
54	3.4
55	2.3
56	2.3
57	2.7
58	2.6
59	2.6
60	2.5
61	2.4
62	2.3
63	1.9
64	1.9
65	.4
66	.4
67	.3
68	.3
69	.5
70	.5
71	.5
72	.4
73	.4
74	.4
75	.3
76	.2
77	.3
78	.4
79	.3
80	.2
81	.3
82	.3
83	.3
84	.2
85	.3
86	.2
87	.3
88	.2
89	.3
90	.2
91	.2
92	.2
93	.2
94	.2
95	.2
96	.2

NOTES:

1. 3 and 6-hour potterns bosed on the Indio area thunderstorm of September 24,1939.
2. 24-hour patterns based on the general storm of March 2 & 3,1938.

RAINFALL PATTERNS IN PERCENT



RCFC & WCD

HYDROLOGY MANUAL

RUNOFF COEFFICIENT CURVES
SOIL GROUP-B
COVER TYPE-URBAN LANDSCAPING
AMC-II
(RUNOFF INDEX NUMBER 56)

PLATE D-5.2

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
NATURAL COVERS -					
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
URBAN COVERS -					
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
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

PLATE D-5.5 (1 of 2)

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
AGRICULTURAL COVERS (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.

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE D-5.6

SECTION 3

EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/25/20 File:EX100.out

Tentative Tract 37558
Drainage Study - Existing Condition
City of Hemet, County of Riverside
By Sikand Engineering Associates

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6057

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Hemet] area used.
10 year storm 10 minute intensity = 1.960(In/Hr)
10 year storm 60 minute intensity = 0.760(In/Hr)
100 year storm 10 minute intensity = 3.050(In/Hr)
100 year storm 60 minute intensity = 1.180(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.180(In/Hr)
Slope of intensity duration curve = 0.5300

↑

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 210.800(Ft.)
Top (of initial area) elevation = 1640.200(Ft.)
Bottom (of initial area) elevation = 1625.000(Ft.)
Difference in elevation = 15.200(Ft.)
Slope = 0.07211 s(percent)= 7.21
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.214 min.
Rainfall intensity = 3.016(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.751
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 0.679(CFS)
Total initial stream area = 0.300(Ac.)
Pervious area fraction = 1.000

↑

++
Process from Point/Station 2.000 to Point/Station 3.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1625.000(Ft.)
End of natural channel elevation = 1612.700(Ft.)
Length of natural channel = 783.700(Ft.)
Estimated mean flow rate at midpoint of channel = 5.661(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:

```
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.72(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0157
Corrected/adjusted channel slope =  0.0157
Travel time =    4.80 min.     TC =   15.01  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.724
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.459(In/Hr) for a   100.0 year storm
Subarea runoff =      7.830(CFS) for      4.400(Ac.)
Total runoff =      8.510(CFS)  Total area =       4.700(Ac.)
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1612.700(Ft.)
End of natural channel elevation =   1608.700(Ft.)
Length of natural channel  =   378.700(Ft.)
Estimated mean flow rate at midpoint of channel =     10.139(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.58(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0106
Corrected/adjusted channel slope =  0.0106
Travel time =    2.45 min.     TC =   17.46  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.712
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.270(In/Hr) for a   100.0 year storm
Subarea runoff =      2.909(CFS) for      1.800(Ac.)
Total runoff =     11.419(CFS)  Total area =       6.500(Ac.)
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1608.700(Ft.)
End of natural channel elevation =   1606.600(Ft.)
Length of natural channel  =   166.000(Ft.)
Estimated mean flow rate at midpoint of channel =     16.075(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.18(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0127
Corrected/adjusted channel slope =  0.0127
Travel time =    0.87 min.     TC =   18.33  min.
```

```
 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.708
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.212(In/Hr) for a   100.0 year storm
Subarea runoff =      8.303(CFS) for      5.300(Ac.)
Total runoff =     19.722(CFS)  Total area =      11.800(Ac.)
```

↟

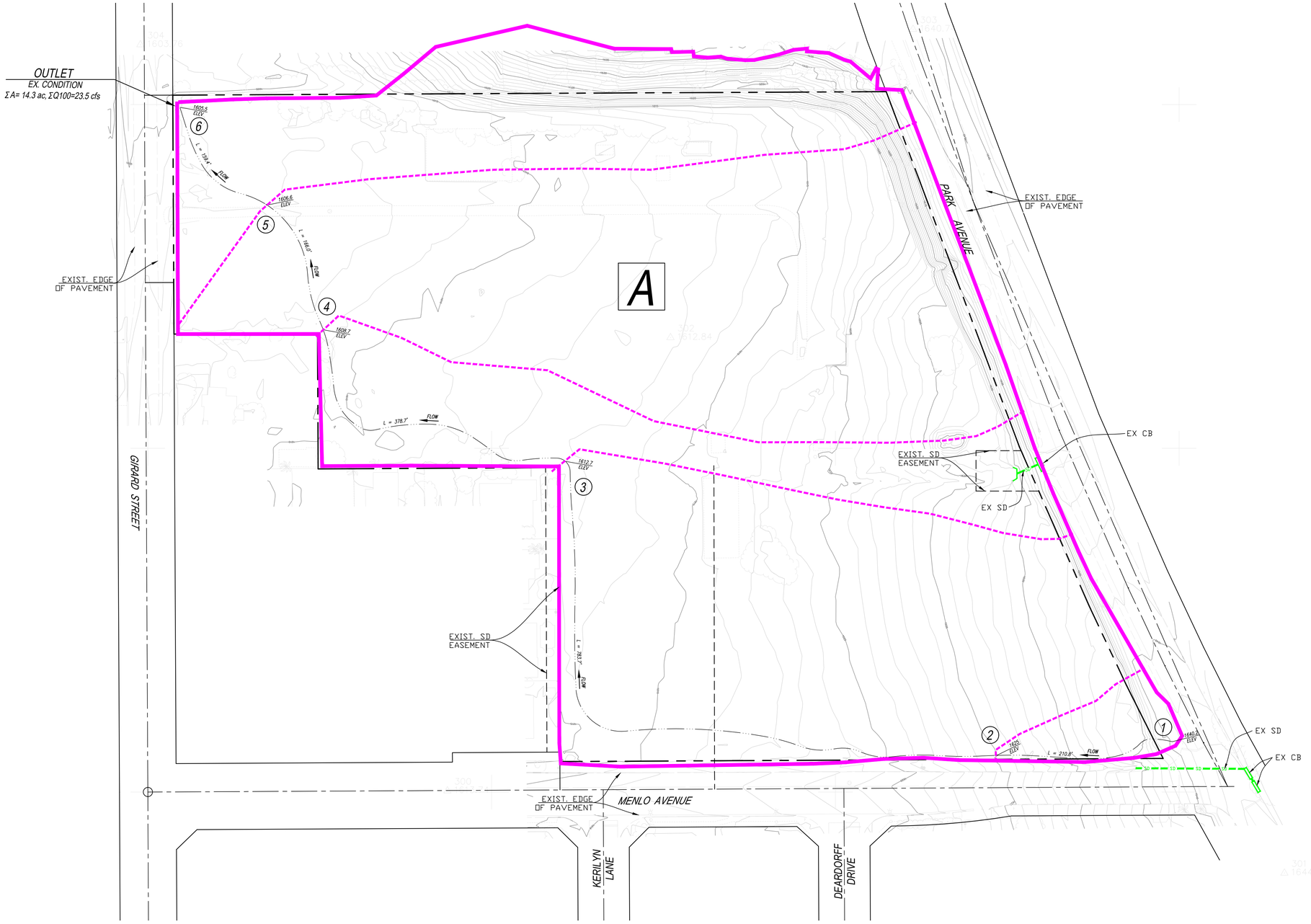
```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1606.600(Ft.)
End of natural channel elevation =   1605.500(Ft.)
Length of natural channel  =   159.400(Ft.)
Estimated mean flow rate at midpoint of channel =     21.812(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.55(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    1.04 min.     TC =   19.37  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.704
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.148(In/Hr) for a   100.0 year storm
Subarea runoff =      3.779(CFS) for      2.500(Ac.)
Total runoff =     23.502(CFS)  Total area =      14.300(Ac.)
```

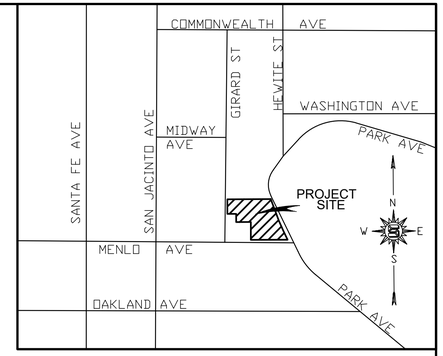
↟

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     14.300(Ac.)
Runoff from this stream =     23.502(CFS)
Time of concentration =   19.37 min.
Rainfall intensity =     2.148(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       23.502     19.37                 2.148
Largest stream flow has longer time of concentration
Qp =     23.502 + sum of
Qp =     23.502

Total of 1 streams to confluence:
Flow rates before confluence point:
      23.502
Area of streams before confluence:
       14.300
Results of confluence:
Total flow rate =     23.502(CFS)
Time of concentration =    19.375 min.
Effective stream area after confluence =     14.300(Ac.)
```

End of computations, total study area = 14.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 69.0





VICINITY MAP
NOT TO SCALE

DRAINAGE CRITERIA

STORM EVENTS: 100-YR DESIGN STORM EVENT
WATERSHED NAME = SAN JACINTO RIVER BASIN
SOIL GROUP = B
PRECIPITATION = 1.180" (100-YR, 1-HOUR)
ANTECEDENT MOISTURE CONDITION = 2
RI INDEX FOR SOIL = 69
DEVELOPMENT TYPE = UNDEVELOPED (FAIR COVER)

LEGEND

- MAIN DRAINAGE BOUNDARY
- SUB-AREA BOUNDARY
- FLOW LINE
- EXISTING STORM DRAIN
- RIGHT-OF-WAY
- (4) .... LOCATION POINT NAME
- A .... DRAINAGE NAME

EXISTING CONDITION

HYDROLOGY MAP

TTM 37558 (APN 439-230-005)
IN THE CITY OF HEMET, RIVERSIDE COUNTY

NORTH

SCALE: 1"=60'

DATE: 01-27-2020

PROJ. NO.: 5118-007

PREPARED FOR :
Mr. Shizao Zheng
1378 West Zhorgshan Road, Ningbo City
Zhejiang Province, China

PREPARED BY :
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd. #100, Van Nuys, CA 91411
Phone : (818) 787- 8550, Fax : (818) 901-7451
www.sikand.com, E-mail: info@sikand.com

REGISTERED PROFESSIONAL ENGINEER
DOUG FARAHER
No.49041
Exp. 09-30-2020
STATE OF CALIFORNIA

SHEET 1 OF 1 SHEET

SECTION 4

PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/23/20 File:PR100.out

Tentative Tract 37558
Drainage Study
City of Hemet, County of RIverside
By Sikand Engineering Associates

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6057

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Hemet] area used.
10 year storm 10 minute intensity = 1.960(In/Hr)
10 year storm 60 minute intensity = 0.760(In/Hr)
100 year storm 10 minute intensity = 3.050(In/Hr)
100 year storm 60 minute intensity = 1.180(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.180(In/Hr)
Slope of intensity duration curve = 0.5300

↑

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 183.200(Ft.)
Top (of initial area) elevation = 1621.000(Ft.)
Bottom (of initial area) elevation = 1619.200(Ft.)
Difference in elevation = 1.800(Ft.)
Slope = 0.00983 s(percent)= 0.98
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.903 min.
Rainfall intensity = 3.455(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 1.374(CFS)
Total initial stream area = 0.500(Ac.)
Pervious area fraction = 0.500

↑

++
Process from Point/Station 2.000 to Point/Station 3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1619.200(Ft.)
End of street segment elevation = 1617.100(Ft.)
Length of street segment = 162.600(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.000(Ft.)
Slope from gutter to grade break (v/hz) = 0.020

```
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.966(CFS)
Depth of flow =   0.296(Ft.), Average velocity =   2.360(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.446(Ft.)
Flow velocity =   2.36(Ft/s)
Travel time =    1.15 min.     TC =    9.05  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.789
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.216(In/Hr) for a   100.0 year storm
Subarea runoff =      5.077(CFS) for      2.000(Ac.)
Total runoff =      6.451(CFS)  Total area =       2.500(Ac.)
Street flow at end of street =      6.451(CFS)
Half street flow at end of street =      3.225(CFS)
Depth of flow =   0.336(Ft.), Average velocity =   2.634(Ft/s)
Flow width (from curb towards crown)=  10.479(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1617.100(Ft.)
End of street segment elevation =  1613.700(Ft.)
Length of street segment  =   253.200(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     12.375(CFS)
Depth of flow =   0.399(Ft.), Average velocity =   3.116(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.635(Ft.)
Flow velocity =   3.12(Ft/s)
Travel time =    1.35 min.     TC =   10.40  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.783
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.987(In/Hr) for a   100.0 year storm
Subarea runoff =     11.694(CFS) for      5.000(Ac.)
Total runoff =     18.145(CFS)  Total area =       7.500(Ac.)
Street flow at end of street =     18.145(CFS)
Half street flow at end of street =      9.073(CFS)
Depth of flow =   0.445(Ft.), Average velocity =   3.416(Ft/s)
Flow width (from curb towards crown)=  15.903(Ft.)
```

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```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
```

```
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1613.700(Ft.)
End of street segment elevation =  1608.800(Ft.)
Length of street segment  =   395.100(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     22.677(CFS)
Depth of flow =   0.480(Ft.), Average velocity =   3.500(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.644(Ft.)
Flow velocity =   3.50(Ft/s)
Travel time =    1.88 min.     TC =   12.29  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.775
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.735(In/Hr) for a   100.0 year storm
Subarea runoff =      8.905(CFS) for      4.200(Ac.)
Total runoff =     27.051(CFS)  Total area =      11.700(Ac.)
Street flow at end of street =     27.051(CFS)
Half street flow at end of street =     13.525(CFS)
Depth of flow =   0.506(Ft.), Average velocity =   3.625(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    0.32(Ft.)
Flow width (from curb towards crown)=  18.982(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1608.800(Ft.)
End of street segment elevation =  1606.500(Ft.)
Length of street segment  =   320.100(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     28.993(CFS)
Depth of flow =   0.561(Ft.), Average velocity =   2.951(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.06(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   2.95(Ft/s)
Travel time =    1.81 min.     TC =   14.09  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.769
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.543(In/Hr) for a   100.0 year storm
Subarea runoff =      3.714(CFS) for      1.900(Ac.)
Total runoff =     30.764(CFS)  Total area =      13.600(Ac.)
Street flow at end of street =     30.764(CFS)
Half street flow at end of street =     15.382(CFS)
Depth of flow =   0.571(Ft.), Average velocity =   2.999(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.53(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1603.500(Ft.)
Downstream point/station elevation =  1600.000(Ft.)
Pipe length  =   139.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.764(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    30.764(CFS)
Normal flow depth in pipe =   17.11(In.)
Flow top width inside pipe =   21.72(In.)
Critical Depth =   22.48(In.)
Pipe flow velocity =     12.84(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    14.27 min.
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.673
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    14.27 min.
Rainfall intensity =      2.526(In/Hr) for a   100.0 year storm
Subarea runoff =      0.850(CFS) for      0.500(Ac.)
Total runoff =     31.614(CFS)  Total area =      14.100(Ac.)
```

↑

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     14.100(Ac.)
Runoff from this stream =     31.614(CFS)
Time of concentration =   14.27 min.
Rainfall intensity =     2.526(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       31.614     14.27                2.526
Largest stream flow has longer time of concentration
Qp =     31.614 + sum of
Qp =     31.614

Total of 1 streams to confluence:
Flow rates before confluence point:
      31.614
Area of streams before confluence:
       14.100
Results of confluence:
Total flow rate =     31.614(CFS)
Time of concentration =    14.275 min.
```

Effective stream area after confluence = 14.100(Ac.)
End of computations, total study area = 14.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.518
Area averaged RI index number = 56.2

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 01/23/20 File:PR10.out

Tentative Tract 37558
Drainage Study
City of Hemet, County of RIverside
By Sikand Engineering Associates

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6057

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Hemet] area used.
10 year storm 10 minute intensity = 1.960(In/Hr)
10 year storm 60 minute intensity = 0.760(In/Hr)
100 year storm 10 minute intensity = 3.050(In/Hr)
100 year storm 60 minute intensity = 1.180(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.760(In/Hr)
Slope of intensity duration curve = 0.5300

↑

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 183.200(Ft.)
Top (of initial area) elevation = 1621.000(Ft.)
Bottom (of initial area) elevation = 1619.200(Ft.)
Difference in elevation = 1.800(Ft.)
Slope = 0.00983 s(percent)= 0.98
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.903 min.
Rainfall intensity = 2.225(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.756
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 0.841(CFS)
Total initial stream area = 0.500(Ac.)
Pervious area fraction = 0.500

↑

++
Process from Point/Station 2.000 to Point/Station 3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1619.200(Ft.)
End of street segment elevation = 1617.100(Ft.)
Length of street segment = 162.600(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.000(Ft.)
Slope from gutter to grade break (v/hz) = 0.020

```
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.452(CFS)
Depth of flow =   0.260(Ft.), Average velocity =   2.134(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.692(Ft.)
Flow velocity =   2.13(Ft/s)
Travel time =    1.27 min.     TC =    9.17  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.056(In/Hr) for a    10.0 year storm
Subarea runoff =      3.077(CFS) for      2.000(Ac.)
Total runoff =      3.918(CFS)  Total area =       2.500(Ac.)
Street flow at end of street =      3.918(CFS)
Half street flow at end of street =      1.959(CFS)
Depth of flow =   0.295(Ft.), Average velocity =   2.354(Ft/s)
Flow width (from curb towards crown)=   8.399(Ft.)
```

↑

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1617.100(Ft.)
End of street segment elevation =  1613.700(Ft.)
Length of street segment  =   253.200(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.476(CFS)
Depth of flow =   0.348(Ft.), Average velocity =   2.766(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.066(Ft.)
Flow velocity =   2.77(Ft/s)
Travel time =    1.53 min.     TC =   10.70  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.740
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.895(In/Hr) for a    10.0 year storm
Subarea runoff =      7.011(CFS) for      5.000(Ac.)
Total runoff =     10.930(CFS)  Total area =       7.500(Ac.)
Street flow at end of street =     10.930(CFS)
Half street flow at end of street =      5.465(CFS)
Depth of flow =   0.386(Ft.), Average velocity =   3.025(Ft/s)
Flow width (from curb towards crown)=  12.961(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
```

```
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1613.700(Ft.)
End of street segment elevation =  1608.800(Ft.)
Length of street segment  =   395.100(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     13.621(CFS)
Depth of flow =   0.415(Ft.), Average velocity =   3.093(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.405(Ft.)
Flow velocity =   3.09(Ft/s)
Travel time =    2.13 min.     TC =   12.83  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.730
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.722(In/Hr) for a    10.0 year storm
Subarea runoff =      5.277(CFS) for      4.200(Ac.)
Total runoff =     16.206(CFS)  Total area =      11.700(Ac.)
Street flow at end of street =     16.206(CFS)
Half street flow at end of street =      8.103(CFS)
Depth of flow =   0.436(Ft.), Average velocity =   3.226(Ft/s)
Flow width (from curb towards crown)=  15.445(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1608.800(Ft.)
End of street segment elevation =  1606.500(Ft.)
Length of street segment  =   320.100(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     17.355(CFS)
Depth of flow =   0.480(Ft.), Average velocity =   2.667(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.682(Ft.)
Flow velocity =   2.67(Ft/s)
Travel time =    2.00 min.     TC =   14.83  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.722
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.594(In/Hr) for a    10.0 year storm
Subarea runoff =      2.186(CFS) for      1.900(Ac.)
Total runoff =     18.392(CFS)  Total area =      13.600(Ac.)
```

```
Street flow at end of street =     18.392(CFS)
Half street flow at end of street =      9.196(CFS)
Depth of flow =   0.488(Ft.), Average velocity =   2.705(Ft/s)
Flow width (from curb towards crown)=  18.090(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1603.500(Ft.)
Downstream point/station elevation =  1600.000(Ft.)
Pipe length  =   139.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.392(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    18.392(CFS)
Normal flow depth in pipe =   12.18(In.)
Flow top width inside pipe =   24.00(In.)
Critical Depth =   18.53(In.)
Pipe flow velocity =     11.50(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    15.03 min.
```

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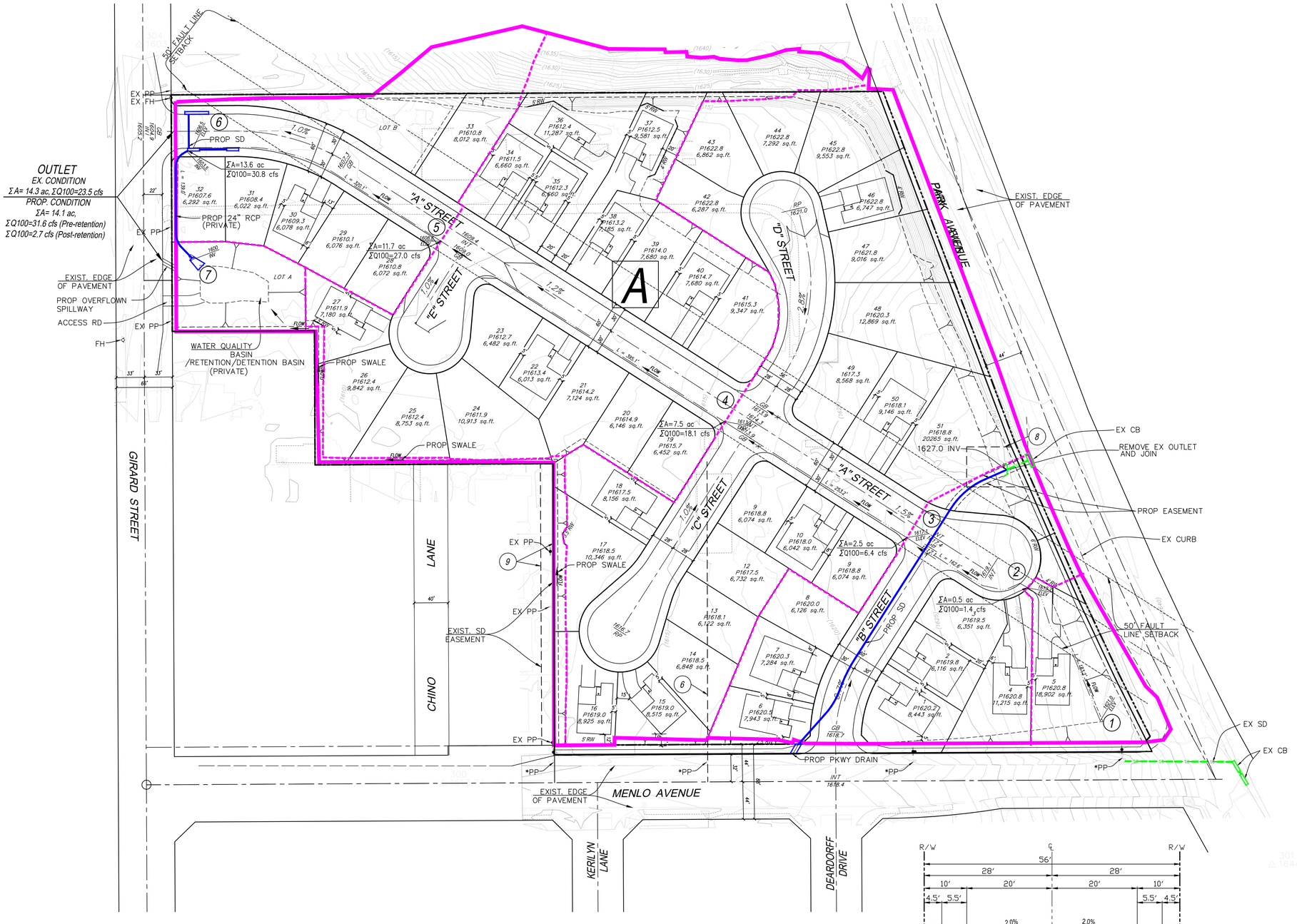
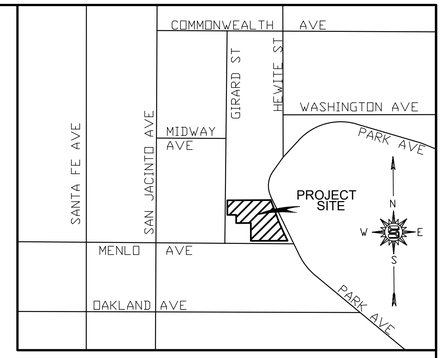
```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.585
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    15.03 min.
Rainfall intensity =      1.583(In/Hr) for a    10.0 year storm
Subarea runoff =      0.463(CFS) for      0.500(Ac.)
Total runoff =     18.855(CFS)  Total area =      14.100(Ac.)
```

↟

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     14.100(Ac.)
Runoff from this stream =     18.855(CFS)
Time of concentration =   15.03 min.
Rainfall intensity =     1.583(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       18.855     15.03                 1.583
Largest stream flow has longer time of concentration
Qp =     18.855 + sum of
Qp =     18.855

Total of 1 streams to confluence:
Flow rates before confluence point:
      18.855
Area of streams before confluence:
       14.100
Results of confluence:
Total flow rate =     18.855(CFS)
Time of concentration =    15.028 min.
Effective stream area after confluence =     14.100(Ac.)
End of computations, total study area =           14.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.518
Area averaged RI index number =  56.2
```





VICINITY MAP
NOT TO SCALE

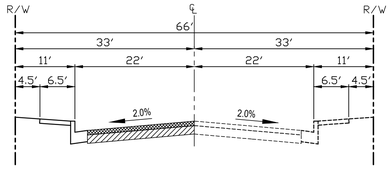
DRAINAGE CRITERIA

STORM EVENTS: 100-YR DESIGN STORM EVENT
10-YR STORM EVENT
WATERSHED NAME = SAN JACINTO RIVER BASIN
SOIL GROUP = B
PRECIPITATION:
0.760" (10-YR, 1-HOUR)
1.180" (100-YR, 1-HOUR)
ANTECEDENT MOISTURE CONDITION = 2
RI INDEX FOR SOIL = 56
DEVELOPMENT TYPE = SINGLE FAMILY ($\frac{1}{4}$ ACRE LOT)

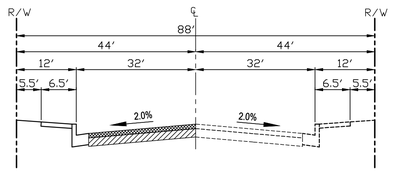
LEGEND

- MAIN DRAINAGE BOUNDARY
- SUB-AREA BOUNDARY
- FLOW LINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN PIPE
- RIGHT-OF-WAY
- (4) .... LOCATION POINT NAME
- A .... DRAINAGE NAME

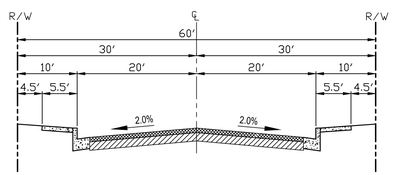
TYPICAL STREET SECTION
(STANDARD. NO. ST-106)
"C", "D" & "E" STREET
N.T.S.



TYPICAL STREET SECTION
(STANDARD. NO. ST-103)
GIRARD STREET
N.T.S.



TYPICAL STREET SECTION
(STANDARD. NO. ST-102)
MENLO AVENUE
N.T.S.



TYPICAL STREET SECTION
(STANDARD. NO. ST-104)
"A"& "B" STREET
N.T.S.

PROPOSED CONDITION

HYDROLOGY MAP

TTM 37558 (APN 439-230-005)
IN THE CITY OF HEMET, RIVERSIDE COUNTY

NORTH

SCALE: 1"=60'

PREPARED FOR :
Mr. Shizao Zheng
1378 West Zhorgshan Road, Ningbo City
Zhejiang Province, China

DATE: 01-27-2020

PROJ. NO.: 5118-007

PREPARED BY :
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd. #100, Van Nuys, CA 91411
Phone : (818) 787- 8550, Fax : (818) 901-7451
www.sikand.com, E-mail: info@sikand.com

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2020
STATE OF CALIFORNIA

SHEET 1 OF 1 SHEET

SECTION 5

PROPOSED HYDROGRAPH CALCULATION

RCFC & WCD HYDROLOGY MANUAL	SYNTHETIC UNIT HYDROGRAPH METHOD Basic Data Calculation Form	Project: TTM 37558, City of Hemet By: ER Date: 01/27/20 Checked: ____ Date: ____	Sheet 1 / 4

PHYSICAL DATA

[1] CONCENTRATION POINT	7
[2] AREA DESIGNATION	A
[3] AREA ~~SQ INCHES~~ ACRES	14.1
[4] AREA ADJUSTMENT FACTOR	0.990
[5] AREA ~~SQ MILES ([3]*[4])~~ ACRES	14.0
[6] L-INCHES	
[7] L ADJUSTMENT FACTOR	
[8] L-MILES ([6]*[7])	0.275
[9] LCA-INCHES	
[10] LCA-MILES ([7]*[9])	0.138
[11] ELEVATION OF HEADWATER	1621.0
[12] ELEVATION OF CONCENTRATION POINT	1600.0
[13] H-FEET ([11]-[12])	21.0
[14] S-FEET/MILE ([13]/[8])	76.36
[15] S**.5	
[16] L*LCA/S**.5 ([8]*[10]/[15])	
[17] AVERAGE MANNINGS 'N'	0.025
[18] LAG TIME-HOURS (24*[17]*[16]**.38) (PLATE E-3)	0.076
[19] LAG TIME-MINUTES (60*[18])	5
[20] 25% OF LAG-MINUTES (.25*[19])	
[21] 40% OF LAG MINUTES (.40*[19])	
[22] UNIT TIME-MINUTES (25-40% OF LAG)	

RAINFALL DATA

[1] SOURCE	Hydrology Manual – NOAA Atlas
[2] FREQUENCY-YEARS	100-year
[3] DURATION:	

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES	[5] AREA ~~SQ IN~~ ACRES	[6] [5] / Σ[5]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES	[9] AREA SQ IN	[10] [9] / Σ[9]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES	[13] AREA SQ IN	[14] [13] / Σ[13]	[15] AVERAGE POINT RAIN INCHES
1.80	14.1	1.00	1.80								
Σ[5]- 14.1			Σ[7]- 1.80	Σ[9]-			Σ[11]-	Σ[13]-			Σ[15]-
[16] AREAL ADJ FACTOR			0.990	(SEE PLATE E-5.8)							
[17] ADJ AVG POINT RAIN			1.78	([16]*Σ[7], ETC)							

PLATE E-2.1 (1 of 2)

RCFC & WCD HYDROLOGY MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD
Basic Data Calculation Form

Project: TTM 37558, City of Hemet
By: ER Date: 01/27/20
Checked: ______ Date: ______

Sheet 2 / 4

LOSS RATE DATA

AVERAGE ADJUSTED LOSS RATE

[1] SOIL GROUP (PLATE C-1)	[2] COVER TYPE	[3] RI NUMBER (PLATE E-6.1)	[4] PERVIOUS AREA INFILTRATION RATE-IN/HR (PLATE E-6.2)	[5] LAND USE	[6] DECIMAL PERCENT OF AREA IMPERVIOUS (PLATE E-6.3)	[7] ADJUSTED INFILTRATION RATE-IN/HR [4](1-.9[6])	[8] AREA ~~SQ INCHES~~ ACRES	[9] [8] / Σ[8]	[10] AVERAGE ADJUSTED INFILTRATION RATE-IN/HR [7]•[9]
B	URBAN, LAWN	56	0.57	SFR 1/4 AC	0.40	0.36	14.1	1.00	0.28
							Σ[8]= 14.1		Σ[10]= 0.28

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

F_m = Minimum Loss Rate $\cong F/2 = \Sigma[10]/2 =$ ________ IN./HR.

$C = (F - F_m)/54 = (\Sigma[10] - F_m)/54 =$ ________

$F_T = C(24-(T/60))^{1.55} + F_m =$ ________ $(24-(T/60))^{1.55} +$ ________ IN./HR.

Where:

T = Time in minutes. To get an average value for each unit time period, Use $T = \frac{1}{2}$ the unit time for the first time period, $T = 1\frac{1}{2}$ unit time for the second period, etc.

RCFC & WCD HYDROLOGY MANUAL	SYNTHETIC UNIT HYDROGRAPH METHOD Unit Hydrograph and Effective Rain Calculation Form	Project: TTM 37558, City of Hemet By: ER Date: 01/27/20 Checked: ____ Date: ____	Sheet 3 / 4

[1] CONCENTRATION POINT	7	[2] AREA DESIGNATION	A
[3] DRAINAGE ~~AREA SQ MILES~~ ACRES	14.1	[4] ULTIMATE DISCHARGE-CFS-HRS/IN (645*[3])	N/A
[5] UNIT TIME-MINUTES 10 (100% TO 200% OF LAG)		[6] LAG TIME-MINUTES	5
[7] UNIT TIME-PERCENT OF LAG (100*[5]/[6])	N/A	[8] S-CURVE	N/A
[9] STORM FREQUENCY & DURATION 100 YEAR- 3 HOUR		[10] TOTAL ADJUSTED STORM RAIN-INCHES	1.78
[11] VARIABLE LOSS RATE (AVG)-INCHES/HOUR	____	[12] MINIMUM LOSS RATE (FOR VAR. LOSS)-IN/HR	
[13] CONSTANT LOSS RATE-INCHES/HOUR	0.28	[14] LOW LOSS RATE-PERCENT	0.28

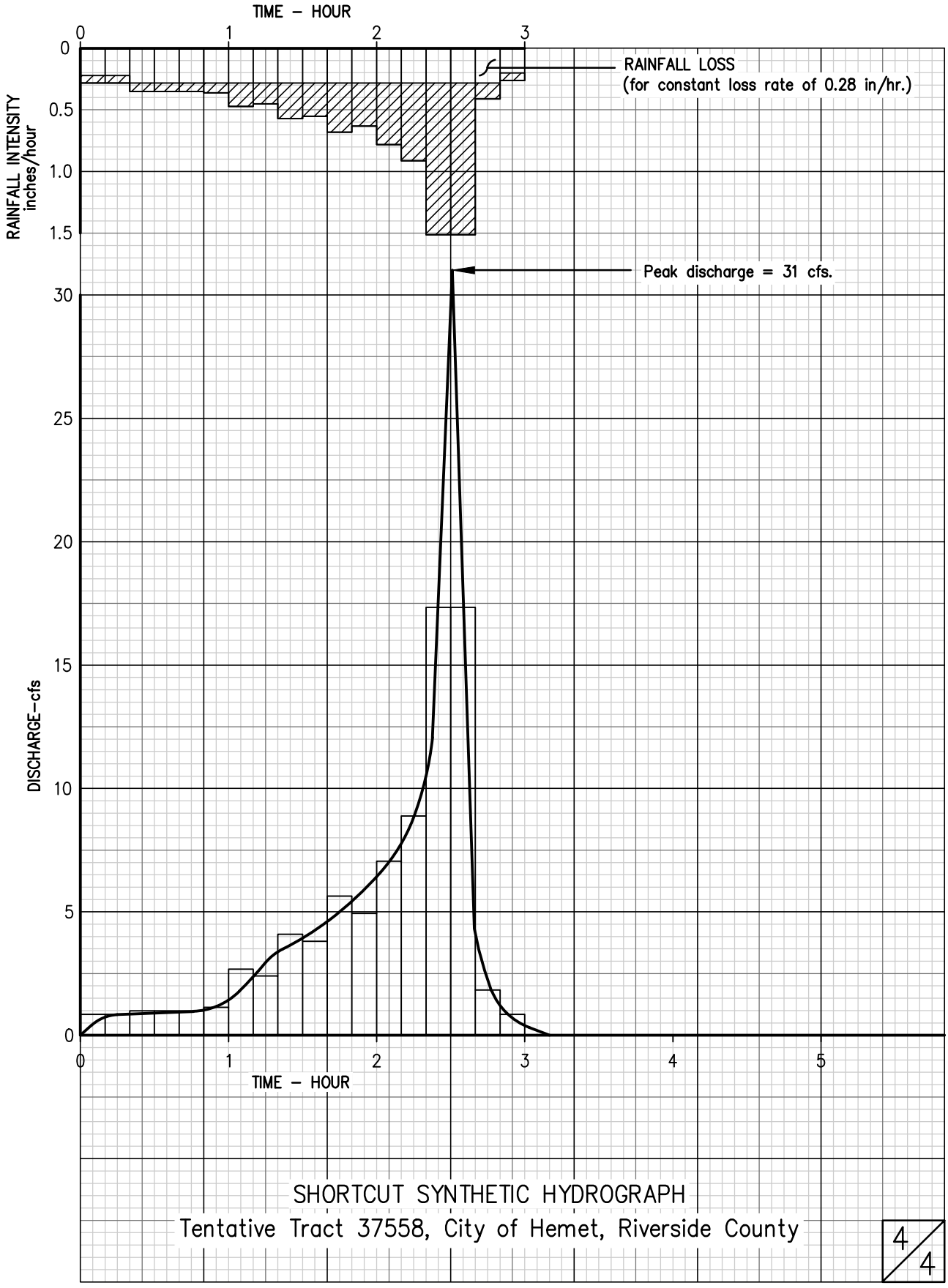
	UNIT HYDROGRAPH				EFFECTIVE RAIN					FLOOD HYDROGRAPH
[15] UNIT TIME PERIOD m	[16] TIME PERCENT OF LAG [7]*[15]	[17] CUMULATIVE AVERAGE PERCENT OF ULTIMATE DISCHARGE (S-GRAPH)	[18] DISTRIB GRAPH PERCENT $[17]_m - [17]_{m-1}$	[19] UNIT HYDROGRAPH CFS-HRS/IN $\frac{[4]*[18]}{100}$	[20] PATTERN PERCENT (PL E-5.9)	[21] STORM RAIN IN/HR $\frac{60[10][20]}{100[5]}$	[22] LOSS RATE IN/HR MAX	[22] LOSS RATE IN/HR LOW	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS
1					2.6	0.278	0.28	0.22	0.06	0.85
2					2.6	0.278	0.28	0.22	0.06	0.85
3					3.3	0.352	0.28		0.07	0.99
4					3.3	0.352	0.28		0.07	0.99
5					3.3	0.352	0.28		0.07	0.99
6					3.4	0.363	0.28		0.08	1.13
7					4.4	0.47	0.28		0.19	2.68
8					4.2	0.449	0.28		0.17	2.4
9					5.3	0.566	0.28		0.29	4.09
10					5.1	0.545	0.28		0.27	3.81
11					6.4	0.684	0.28		0.4	5.64
12					5.9	0.63	0.28		0.35	4.94
13					7.3	0.78	0.28		0.5	7.05
14					8.5	0.908	0.28		0.63	8.88
15					14.1	1.506	0.28		1.23	17.34
16					14.1	1.506	0.28		1.23	17.34
17					3.8	0.406	0.28		0.13	1.83
18					2.4	0.256	0.28	0.20	0.06	0.85
					Σ= 100.0				Σ = 5.86	

SHORTCUT METHOD

EFFECTIVE RAIN = [23] x UNIT TIME – HRS
= 5.86 IN/HR x (10/60) HRS
= 0.98 IN

FLOOD VOLUME = EFFECTIVE RAIN x AREA
= 0.98 IN x (1'/12") x 14.1 ACRES
= 1.15 ACRE-FEET

PLATE E-2.2



SHORTCUT SYNTHETIC HYDROGRAPH

Tentative Tract 37558, City of Hemet, Riverside County

4/4

SECTION 6

PRELIMINARY SITE RETENTION

RETENTION/DETENTION (PRIVATE) BASIN CALCULATION

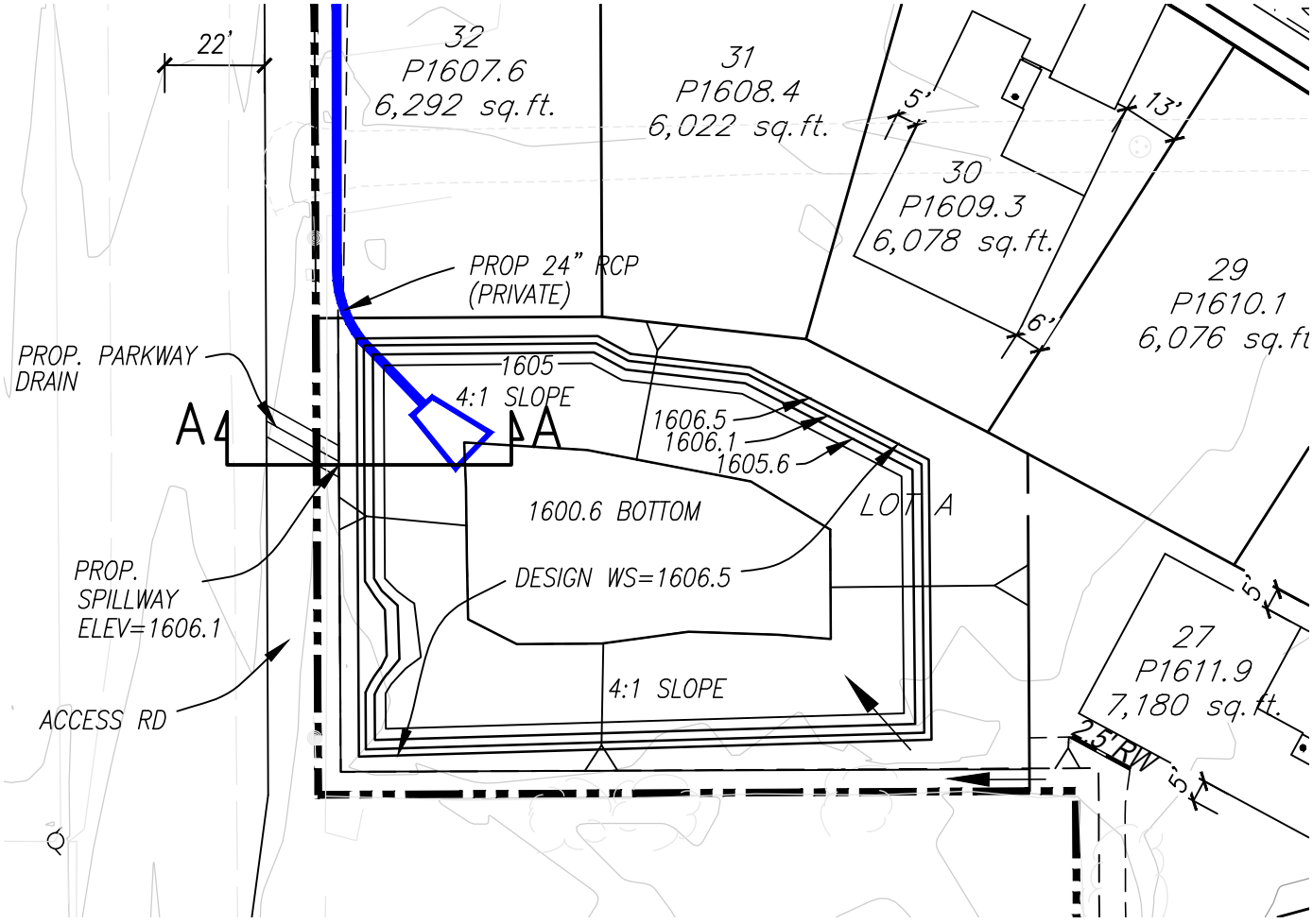
NORTH

PLAN

SCALE: 1" = 40'

DEPTH VS CAPACITY

Elevation	Area (ft^2)	Volume (ft^3)	Capacity (ft3)	
1,600.60	3,025	-	-	
1,605.60	9,085	30,275.00	30,275.00	
1,606.10	9,888	4,743.25	35,018.25	← RETENTION LEVEL
1,606.50	10,617	4,101.00	39,119.25	← DETENTION LEVEL



SIKAND
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BY:	E.R.
W.O. NO.:	5118-007
DATE:	01/27/20
SCALE:	

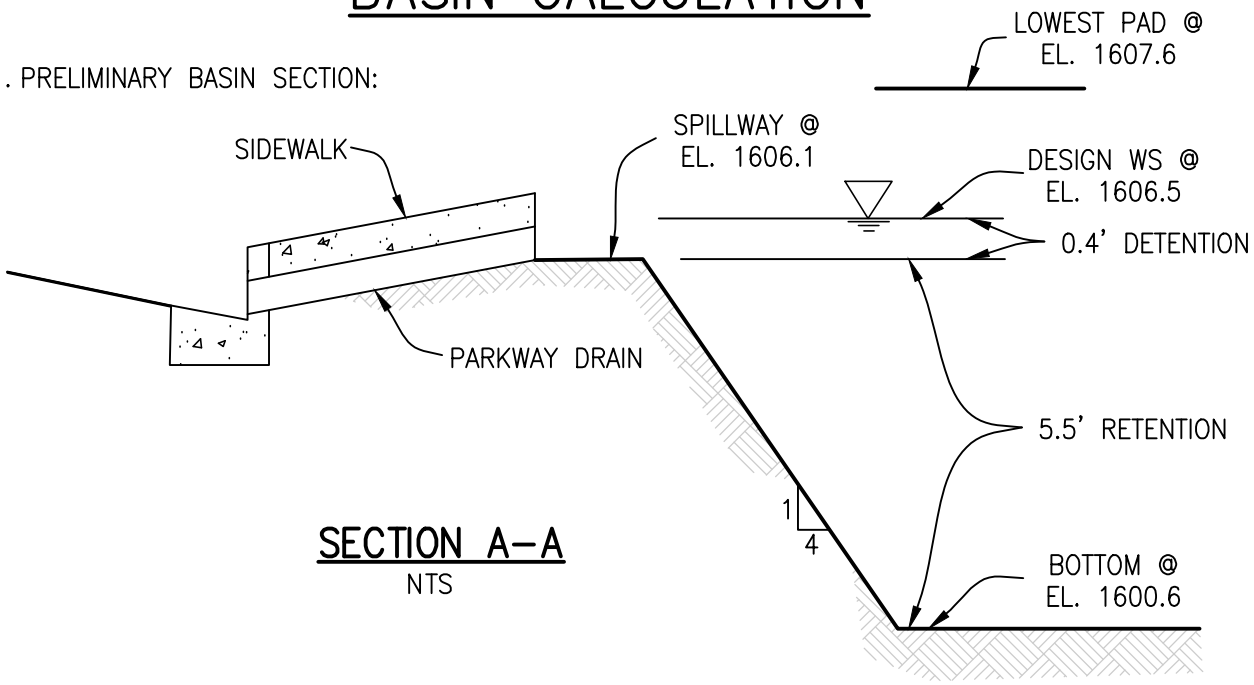
CLIENT: **Mr. Shizao Zheng**
1378 West Zhorgshan Road, Ningbo City
Zhejiang Province, China

PROJECT: **TTM 37558**
City of Hemet, Riverside County

SHT. 1 OF 2

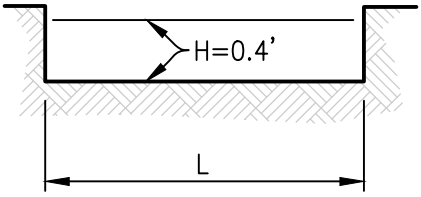
RETENTION/DETENTION (PRIVATE) BASIN CALCULATION

1. PRELIMINARY BASIN SECTION:



SECTION A–A
NTS

2. BROAD–CRESTED WEIR:



$Q = CLH^{3/2}$

$C = 2.80$

$Q = 2.7$ CFS

SOLVING FOR $L = \frac{Q}{CH^{3/2}} = 3.81'$

USE L = 4'

3. DRAWDOWN:

RETENTION DEPTH = 5.5 FT

INFILTRATION RATE = 4.53 INCH/HR (SEE PRELIM. INFILTRATION TEST REPORT)

FACTOR OF SAFETY = 3

DESIGN INFILTRATION RATE = $\frac{4.53 \text{ INCH/HR}}{3} = 1.51$ INCH/HR

TIME TO DRAIN = $\frac{5.5 \text{ FT}}{(1.51 \text{ INCH/HR}) \times (1 \text{ FT}/12 \text{ INCHES})} =$ 43.7 HOURS

LESS THAN 72 HRS MAX, THEREFORE OKAY!

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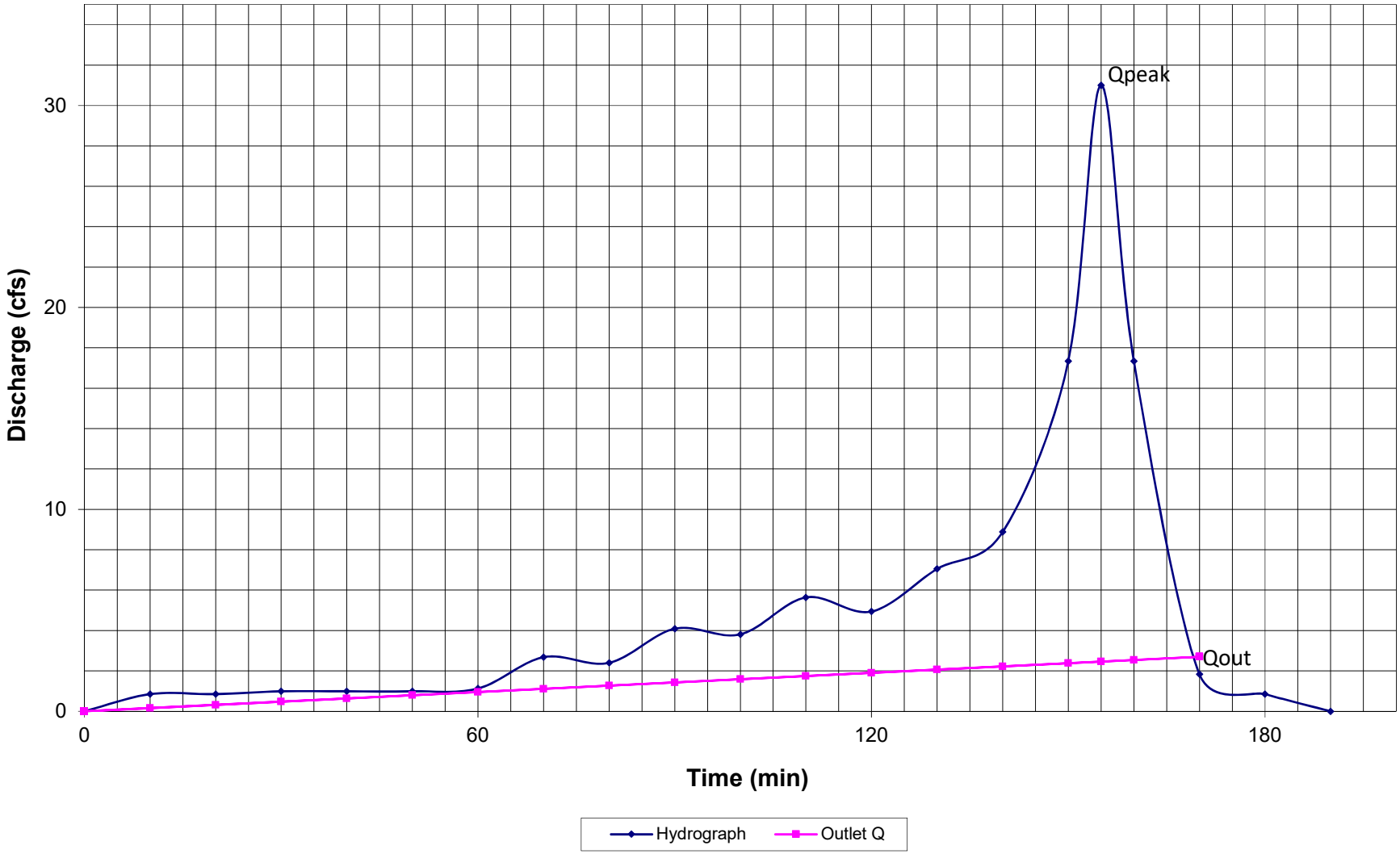
BY:	E.R.	CLIENT:	**Mr. Shizao Zheng** 1378 West Zhorgshan Road, Ningbo City Zhejiang Province, China	SHT. 2
W.O. NO.:	5118–007			
DATE:	01/27/20	PROJECT:	**TTM 37558** City of Hemet, Riverside County	OF 2
SCALE:				

Preliminary Retention Volume



$V_{REQ'D}$ (c.f.) =	**39,120**
$V_{REQ'D}$ (c.y.) =	**1,449**
$V_{REQ'D}$ (ac-ft) =	**0.90**

Q_{PEAK} (cfs) =	**31.00**
Q_{OUT} (cfs) =	**2.70**

Eumir_file

LGC GEO-ENVIRONMENTAL, INC.

Preliminary Infiltration Testing Investigation for the Proposed Single-Family Residential Development, Located at 800 N. Girard Street, City of Hemet, Riverside County, California

Dated: October 14, 2019
Project No. G18-1647-20

Prepared For:

Mr. Shizao Zheng
1378 West Zhorgshan Road
Ningbo City, Zhejiang Province
China

27570 Commerce Center Drive, Suite. 128, Temecula, California 92590
Phone: 951.297.2450 I Fax: 951.719.2998 I www.lgcgeoenv.com

October 14, 2019 Project No. G18-1647-20

Mr. Shizao Zheng
1378 West Zhorgshan Road
Ningbo City, Zhejiang Province
China

Subject: ***Preliminary Infiltration Testing Investigation for the Proposed Single-Family Residential Development, Located at 800 N. Girard Street, City of Hemet, Riverside County, California.***

1.0 INTRODUCTION

LGC Geo-Environmental, Inc. (LGC) is pleased to present this preliminary infiltration testing investigation for the proposed single-family residential development, located at 800 N. Girard Street, City of Hemet, Riverside County, California. The purpose of our study was to determine the vertical infiltration rates and physical characteristics of the subsurface soils in selected areas of proposed onsite storm water infiltration BMP devices within specific portions of the subject property.

2.0 PROPERTY LOCATION AND DESCRIPTION

The subject site is irregular in shape and is located on the northeast corner of E. Menlo Avenue and Park Avenue in the City of Hemet, Riverside County, California. The site is bounded on the north by residential development, on the west by Girard Street and residential development, on the south by E. Menlo Avenue and residential development, and east by Park Avenue. The general location and configuration of the site is shown on the Site Location Map (Figure 1).

The subject site has been previously graded and filled. Currently, it is a vacant lot with several concrete pads, a roadway, and various small structures. Vegetation growth is present on the subject site.

The topography of the site is slightly inclined with sheet drainage appearing to flow from east to west. The existing site elevations vary from approximately 1,637 feet above mean sea level (msl) near the northeast corner of the site, to approximately 1,607 msl at the northwest corner of the site.

3.0 PROPOSED CONSTRUCTION

The referenced "Preliminary Site Plan", prepared by Sikand Engineering Associates, indicates that the proposed single-family residential development will be comprised of 49 graded pads, associated roadways, one water quality detention basin, and landscape and hardscape areas. The development is proposed to be two family duplex dwelling units at this time.

4.0 SUBSURFACE EXPLORATION: INFILTRATION TESTING

4.1 Subsurface Exploration

Subsurface exploration of the subject site was performed on October 10, 2019 and consisted of advancing two (2) infiltration test borings. The borings were excavated within the proposed infiltration system location utilizing a hollow stem drill rig to a depth of 10 feet below existing grade. A third boring was excavated to a depth of 20 feet, to observe the depth to groundwater. These logs are presented in Appendix A. Earth materials encountered within the locations were classified in general accordance with the visual manual procedures of the Unified Soil Classification System (USCS). Logs of the infiltration borings are presented in Appendix A, and their approximate locations are depicted on the Infiltration Test Location Map (Plate 1).

Prior to the subsurface exploration work, an underground utilities clearance was obtained from Underground Service Alert of Southern California.

4.2 Infiltration Testing

On October 11, 2019, two (2) infiltration tests were conducted within the proposed area of the infiltration system. The infiltration test borings were labeled IB-1 through IB-2; and are depicted on the Infiltration Test Location Map (Plate 1). The tests were performed as per the referenced Riverside County Technical Guidance Manual for Onsite Wastewater Treatment Systems.

Once the required depth of 10 feet below existing surface was obtained, a 2-inch layer of 3/4 inch gravel was placed at the bottom of the borings and polyvinyl chloride pipe (PVC), with a nominal diameter of 3 inches, was inserted into the borings. The PVC pipe installed in the infiltration borings contained 0.375-inch diameter perforations only within the lower 2 feet to 3 feet. The annular space around the 2 feet to 3 feet perforated zone was backfilled with 3/4-inch gravel. The remaining portion annular space with solid pipe was backfilled with native soil. A pre-soak period was then conducted to allow the test holes to presaturate before beginning the infiltration test. At the beginning of the infiltration test, a sandy soils test was performed with two consecutive readings taken within 25 minutes, to measure a water drop of at least 6 inches. Upon completion of the sandy soils test, IB-1 readings were taken at 10-minute intervals for the entirety of the infiltration test and IB-2 readings were taken at 30-minute intervals for the entirety of the infiltration test, with the drop in water level being recorded at the end of each interval. Minor settlement of the backfill soils may occur over time.

To acquire the vertical design infiltration test rates, the field percolation rates, which have vertical and sidewall infiltration, were reduced utilizing a reduction factor per the Porchet Method standard in order to get a vertical design infiltration rate. A reduction factor of 5.16 and 5.58 was applied to the field percolation rates for IB-1 and IB-2, respectively. The results of the percolation method infiltration tests are presented in the following table in section 5.3. The infiltration test data sheets are presented in Appendix A.

5.0 FINDINGS

5.1 Earth Materials

Based on our review of the data from the geotechnical investigation, and our current investigation of the proposed infiltration basin, the materials encountered to the depths explored include artificial fill and alluvium. A description of the earth material and soils encountered is described below:

Artificial Fill, Undocumented (Afu): Artificial fill was encountered on the site during our subsurface exploration and was observed at a depth approximately 1 foot to 5 feet below the surface, in all the borings. The artificial fill generally consists of silty sand and is various shades of brown. The material is damp to moist; and very fine to fine grained with some medium grains.

Alluvium (Qal): Alluvium was encountered below the topsoil, to an observed depth of about 20 feet below the surface. The alluvium is generally silty sand to sandy silt, and is characterized as being various shades of brown; moist; very fine to fine grained, with occasional medium grains; and slightly micaceous.

5.2 Groundwater

Groundwater was not encountered during exploratory drilling. A review of the California Department of Water Resources, Water Data Library online database indicates the presence of groundwater less than a mile away from the general site area as approximately 267 feet below the existing ground surface according to historical records at an elevation of approximately 1,588 above mean sea level (Well ID: Station 337574N1169698W001).

5.3 Infiltration Testing Results

The shallow infiltration testing rates for design considerations for the proposed infiltration system area which was tested are presented in the table below.

Infiltration Design Rates

TEST NO.	TEST LOCATION	TEST DEPTH (Feet)	INFILTRATION RATES		SOIL DESCRIPTION (USCS)
			FIELD PERCOLATION RATE (INCHES/HOUR)	DESIGN INFILTRATION RATE (INCHES/HOUR)	
IB-1	Infiltration Basin	10	40.50	7.85	SM
IB-2	Infiltration Basin	10	6.00	1.21	ML/SM

6.0 CONCLUSIONS AND RECOMMENDATIONS

Shallow infiltration testing for the proposed infiltration system indicates design rates of 7.85 inches/hour and 1.21 inches/hour, for IB-1 and IB-2, respectively, at a depth of 10 feet after applying reduction factors shown in the Table above, per the Porchet Method. The design rates representing the infiltration devices proposed to be installed, should be utilized for the proposed infiltration device location, as indicated on the Infiltration Test Location Map (Plate 1). An average composite design rate of **4.53 inches/hour** for the proposed infiltration basin represented by testing from infiltration test borings IB-1 and IB-2 can be utilized.

The proposed infiltration basin device should be placed at least five (5) feet horizontally away from or beyond a 1:1 (horizontal to vertical) projection from the base of any proposed or existing structures or walls, whichever is greater. Since the proposed infiltration basin device is within and/or adjacent to proposed roadways, parking areas and/or sidewalks (within five (5) feet) and may be up to approximately three (3) feet deep, any gravel backfill should be densified or any soil backfill should be compacted to at least 90% of the maximum dry density during placement. The project geologist or engineer should observe infiltration device excavations during trenching to verify the anticipated soil units and geotechnical conditions as well as observe, probe and/or test any densification or compaction of the infiltration trench and pit gravel and/or soil backfill.

7.0 PLAN REVIEWS AND CONSTRUCTION SERVICES

This report was prepared for the exclusive use of Mr. Shizao Zheng to assist the project civil engineer in the design of the proposed infiltration systems for the proposed development. It is recommended that LGC be engaged to review infiltration device plans, grading plans, foundation plans and the final infiltration design drawings and specifications prior to construction. This is to document that the recommendations contained in this report were properly interpreted and incorporated into the project plans and specifications from a geotechnical standpoint. Plans should be forwarded to the project geotechnical engineer and/or engineering geologist for LGC for review and comments, as deemed necessary. LGC's review of infiltration device plans, grading plans, foundation plans and the final infiltration design drawings and specifications may indicate that additional subsurface exploration, laboratory testing and analysis should be performed to address areas of concern. If LGC is not accorded the opportunity to review these documents, we cannot take responsibility for misinterpretation of our recommendations.
If the project plans change significantly (e.g., location and type of infiltration devices), LGC should be retained to review our original design recommendations and applicability to the revised construction. If conditions are encountered during construction that appears to be different from those indicated in this report, this office should be notified immediately. Design and construction revisions may be required.

The preliminary conclusions and recommendations provided in this report are based on review of previous geotechnical reports, infiltration testing, geologic field mapping, and geotechnical/geologic analyses to date. A representative of LGC should observe the interpolated subsurface conditions in the field during construction

We recommend that LGC be retained to provide geotechnical engineering services during future grading, infiltration device excavations, installation of infiltration materials, backfill of infiltration devices, or when an unusual soil condition is encountered at the site. This is to document compliance with the design, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

8.0 INVESTIGATION LIMITATIONS

This report is based upon information provided by the client and the project civil engineer, a limited number of subsurface excavations, field observations and percolation/infiltration tests to which we applied various methods of analysis and interpretation. The materials encountered and tested in the field on the project site are believed representative of the project area, and the conclusions and recommendations contained herein are presented on that basis. However, soil materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions, recommendations, and performance of the proposed storm water infiltration device BMP systems. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation, and the other factors not in evidence at the time measurements were made. If this occurs, the changed conditions must be evaluated by the project geotechnical engineer and engineering geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field.

The conclusions and opinions contained in this report are based on the results of the described geotechnical evaluations and represent our professional judgment. The findings, conclusions and recommendations contained in this report are to be considered tentative only and subject to confirmation by the undersigned during the construction process. Without this confirmation, this report is to be considered incomplete and LGC or the undersigned professionals assume no responsibility for its use.

The conclusions and opinions contained in this report are valid up to a period of 2 years from the date of this report. Changes in the conditions of a property can and do occur with the passage of time, whether they be because of natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate codes or standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, if any of the above mentioned situations occur, an update of this report should be completed.

This report has not been prepared for use by parties or projects other than those named or designed above. It may not contain sufficient information for other parties or other purposes.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.
Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by engineers and geologists practicing in this or other localities. The contents of this report are professional opinions and as such, are not to be considered a guarantee or warranty.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

Respectfully submitted,

LGC Geo-Environmental, Inc.

Mark Bergmann CEG 1348
Certified Engineering Geologist/President

JJL/MB

Distribution: (2) Addressee

Attachments: Figure 1 – Site Location Map
Appendix A – Infiltration Boring Logs *(Rear of Text)*
Appendix B – Infiltration Test Results *(Rear of Text)*
Plate 1 – Infiltration Test Location Map *(Pocket Enclosure)*

FIGURE 1
SITE LOCATION MAP

Project Name	SIKAND
Project No.	G18-1647-20
Geol./ Eng.	MB
Scale	NOT TO SCALE
Date	OCTOBER 2019

APPENDIX

REFERENCE REPORT/PLANS

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
RIVERSIDE, CALIFORNIA

MASTER DRAINAGE PLAN

FOR THE

SAN JACINTO VALLEY

ZONE 4

WARREN D. WILLIAMS
GENERAL MANAGER–CHIEF ENGINEER

OCTOBER 2015

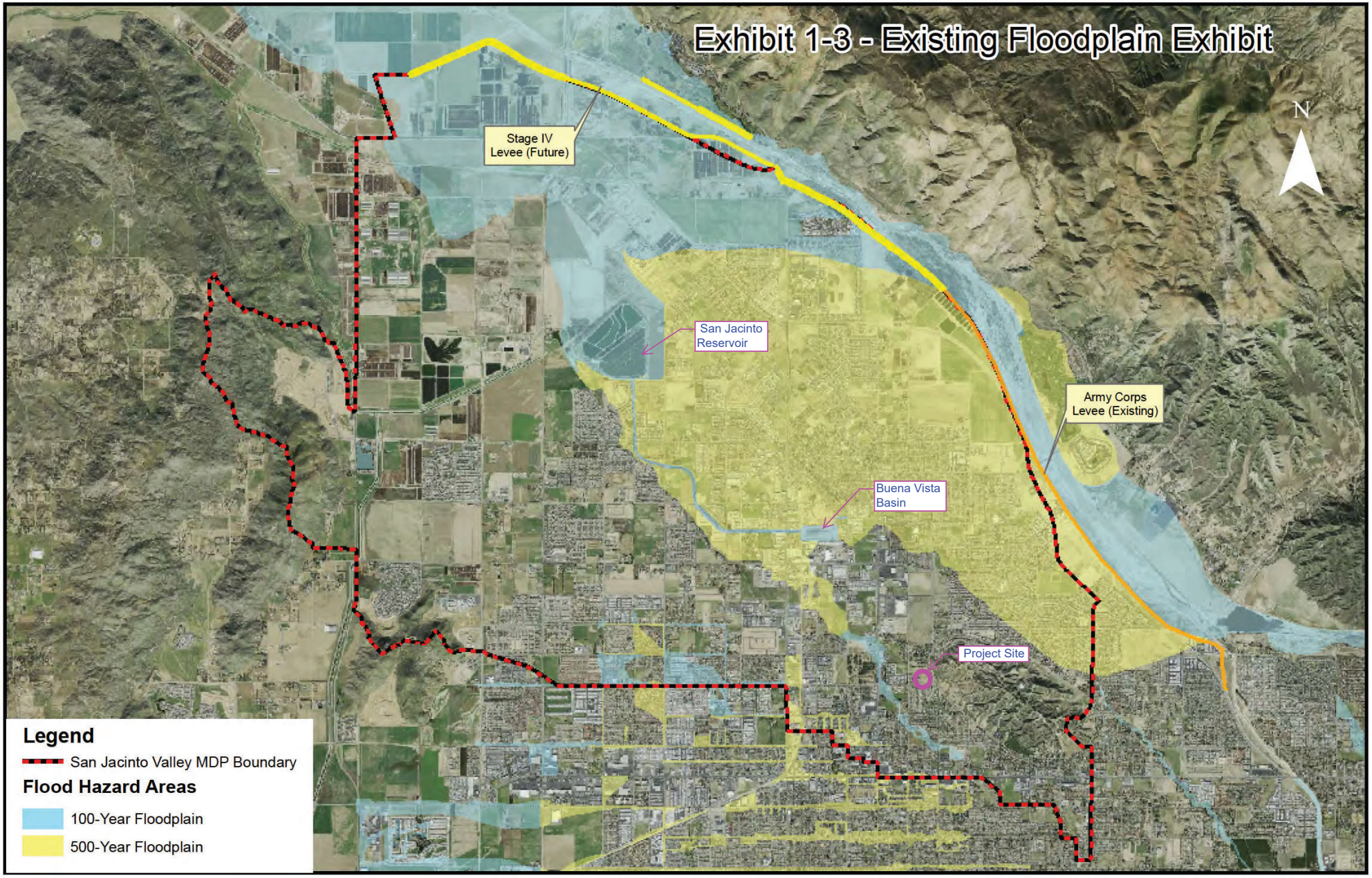
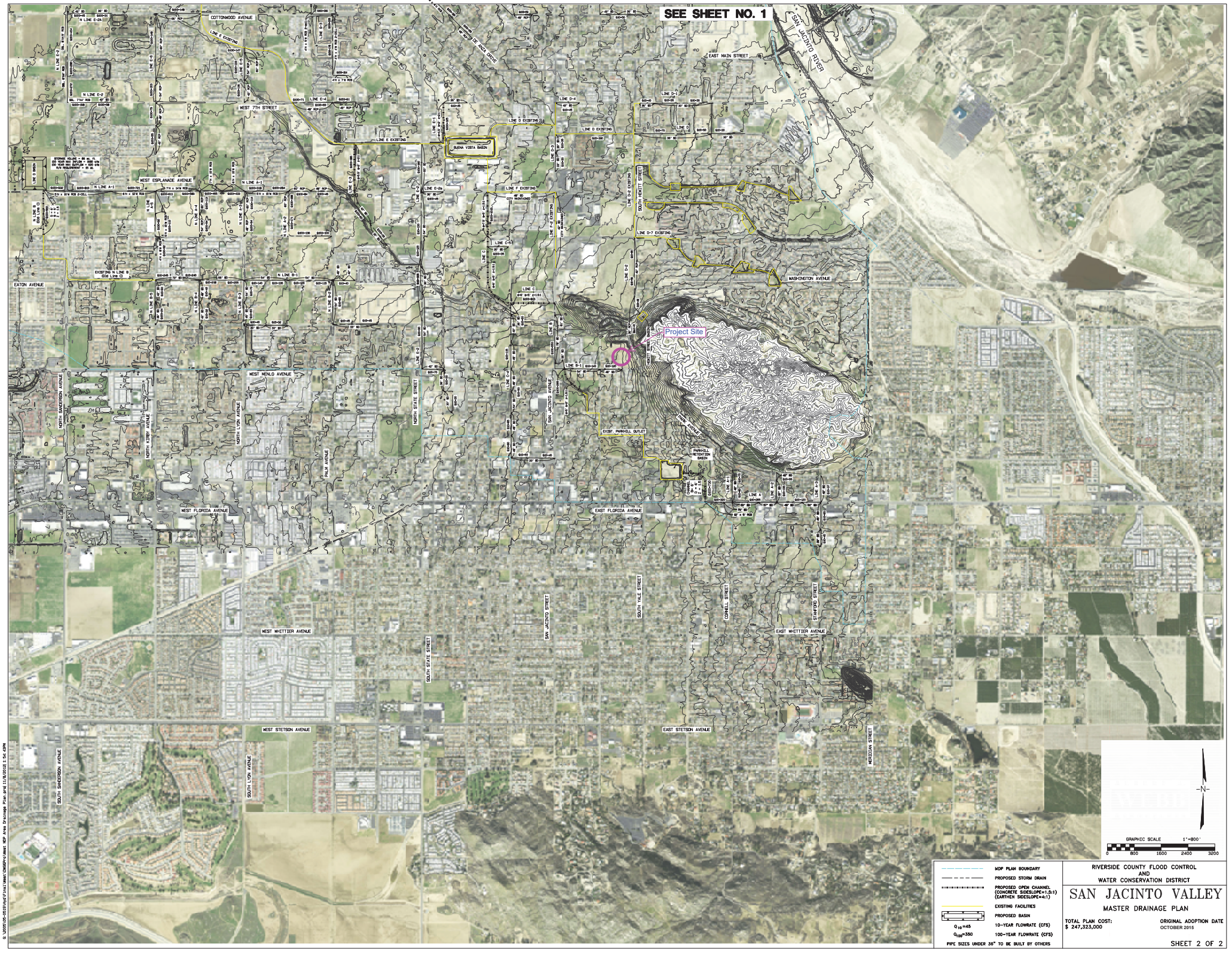


Exhibit 1-3 - Existing Floodplain Exhibit
N
Stage IV Levee (Future)
San Jacinto Reservoir
Army Corps Levee (Existing)
Buena Vista Basin
Project Site
Legend
San Jacinto Valley MDP Boundary
Flood Hazard Areas
100-Year Floodplain
500-Year Floodplain


SEE SHEET NO. 1
Project Site
COTTONWOOD AVENUE
EAST MAIN STREET
SAN JACINTO RIVER
WEST 7TH STREET
WEST ESPLANADE AVENUE
EATON AVENUE
WASHINGTON AVENUE
WEST MENLO AVENUE
WEST FLORIDA AVENUE
EAST FLORIDA AVENUE
WEST WHITTIER AVENUE
EAST WHITTIER AVENUE
WEST STETSON AVENUE
EAST STETSON AVENUE
SOUTH SANDERSON AVENUE
SOUTH LYON AVENUE
NORTH SANDERSON AVENUE
NORTH LYON AVENUE
NORTH KIRBY AVENUE
PALM AVENUE
NORTH STATE STREET
SOUTH STATE STREET
SAN JACINTO STREET
SOUTH VALE STREET
CORNELL STREET
STANFORD STREET
MERIDIAN STREET
SOUTH HOWTH STREET
BUENA VISTA BASIN
EXIST. PARKHILL OUTLET
PARKHILL RETENTION BASIN
LINE A
LINE B
LINE C
LINE D
LINE E
LINE F
LINE A EXISTING
LINE D EXISTING
LINE E EXISTING
LINE F EXISTING
LINE D-7 EXISTING
N
GRAPHIC SCALE 1"=800'
0 800 1600 2400 3200
MDP PLAN BOUNDARY
PROPOSED STORM DRAIN
PROPOSED OPEN CHANNEL (CONCRETE SIDESLOPE=1.5:1) (EARTHEN SIDESLOPE=4:1)
EXISTING FACILITIES
PROPOSED BASIN
Q_{10}=45 10-YEAR FLOWRATE (CFS)
Q_{100}=350 100-YEAR FLOWRATE (CFS)
PIPE SIZES UNDER 36" TO BE BUILT BY OTHERS
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SAN JACINTO VALLEY
MASTER DRAINAGE PLAN
TOTAL PLAN COST: $ 247,323,000
ORIGINAL ADOPTION DATE OCTOBER 2015
SHEET 2 OF 2