Appendix H

Preliminary Drainage Study

PRELIMINARY DRAINAGE STUDY

Bamiyan Marketplace

TRACT TTM 37578 / PA 2019-07

City of Lake Elsinore
County of Riverside

PREPARED FOR:

ZAIREY, INC.
45 Cinch Road
Bell Canyon, CA 91302
818.601.0374

PREPARED BY:

SB&O INC.
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
858-560-1141
858-560-8157 Fax

SB&O JOB NO. 76020.25

ALLEN L BUTCHER, PE C47107

REGISTERED PROFESSIONAL ENGINEER
ALLEN L. BUTCHER
No. 47107
CIVIL
STATE OF CALIFORNIA

March 1, 2021

TABLE OF CONTENTS

EXHIBITS

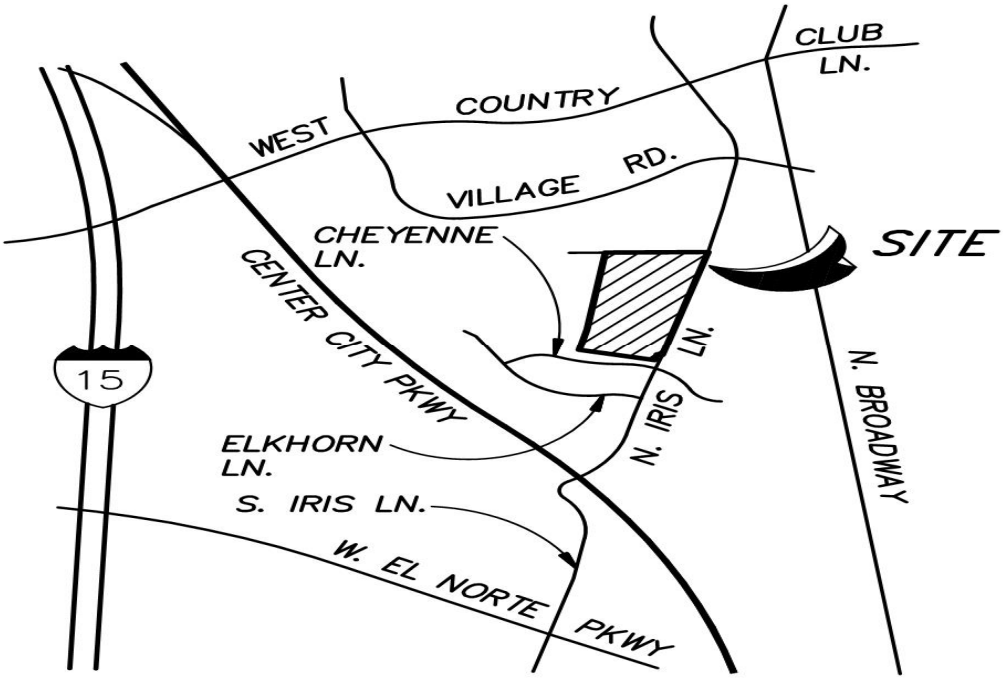
APPENDIX

DRAINAGE MAPS

1. Introduction

The scope of this preliminary report is limited to addressing the potential storm water impacts associated with the development of the site, in accordance with the Riverside County Hydrology Manual (June 2003). This report will provide estimates of the peak site discharges of storm water runoff generated in the post development from the site and frontage improvements for the 100-year storm events. Detailed hydrology and hydraulic calculations for the proposed site and public storm drains system will be provided in the final report. Since the project is exempt from hydromodification, and will directly discharge to Lake Elsinore, flow estimates for the existing condition, nor detention modeling is warranted.

This project is considered a priority development project, see the Water Quality Management Plan (SWQMP) report for the project. The storm water treatment facility and have been shown on the Proposed DMA Drainage Exhibit attached to this study. The total disturbed area is approximately 12 acres, necessitating a Storm Water Pollution Prevention Plan (SWPPP) for construction.



2. Declaration of Responsible Charge

DECLARATION OF RESPONSIBLE CHARGE:

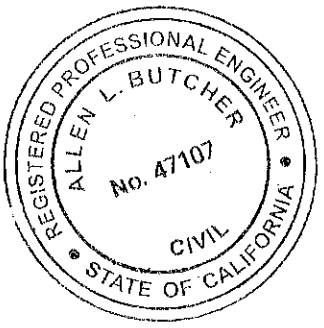
I hereby declare that I am the Engineer of Work for this project, that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the current standards.

I understand that the check of the project drawings and specification by the City of Lake Elsinore is confined to a review only and does not relieve me, as the Engineer of Work, of my responsibilities for project design.

EINGINEER OF WORK:

SB&O, Inc.
3990 Ruffin Road, Suite 120
San Diego, CA 92123
Phone: 858-560-1141

Allen L Butcher, PE C47107 03-01-2021 Date



3. Existing Drainage Conditions

The property is within the western portion of the City of Lake Elsinore, located approximately 1,500 feet from the western limits of Lake Elsinore. The 12-acre site is located on the west side of Grand Avenue between Ortega Highway (SR-74) and Macy Street.

Site drainage patterns are generally overland (1% to 2.5% range) from west to east toward Grand Avenue, with a manufactured slope (15' height) along the western boundary, up to the existing homes (Lake Terrace Drive). Site and frontage runoff is directed to a localized low point near the midpoint of the Grand Ave frontage.

A RCFCWCD storm drain retrofit project (12' wide and 10' tall box culvert per Project 3-0-00070-91 / Drawing 3-0215) is currently under construction at the base of the slope along the west boundary (Ortega Channel Retrofit Stage 91). The system conveys runoff from Hwy 74 (84" RCP) through the site connecting to the 120" diameter storm drain turning east across the site toward Lake Elsinore. The system conveys runoff from neighborhood located west of the site, via 60" RCP storm drain.

See Drainage Exhibits in Map Pockets #1 & #2.

4. Post-Development Drainage Conditions

The project proposes commercial land uses in the south (gas station, car wash, drive through restaurant, mixed use) and attached residential in the north portion of the project. Proposed finished grades in the development areas are expected to be mild (0.5% to 3.0% range), with steeper grades at the driveways, and manufactured slopes along the perimeter.

The site and frontage flows will maintain the existing drainage patterns and remain tributary to the existing Ortega Channel storm drain system at the site. The drainage systems onsite will include a mix of overland, gutter and pipe flows directed to the site basins and proprietary BMPs for treatment. These will occur at multiple locations throughout the site.

The project will complete the frontage improvements, resulting in additional paving widths, curb & gutter, and sidewalk which will require multiple curb inlets. These new impervious areas will be treated by proprietary treatment BMPs.

See Drainage Exhibit in Map Pockets #1 & #2.

5. Hydrology

5.1 Design Criteria

In accordance with the Riverside County Flood Control & Water Conservation District Hydrology Manual, the Rational Method was used to estimate peak flow rates for the 100-year 1-hour storms.

5.2 Soils

The project soil report documents the existing soils as alluvial sandy silt, consistent with hydrologic soul group “C”, with reduced infiltration capacity. Since the site is likely to import soil

5.3 Runoff Coefficient C-Factor

Runoff coefficients are selected based upon the impervious % of the development area, and the rainfall intensity in accordance with Plate D-5.3 for Soil Group “C”.

5.4 Rainfall

One hour precipitation total rainfall and the slope of the IDF Curve were determined form RCFC& WCD Plats D-4.3. 4.4 and 4.5 as follows;

Storm Event	1-Hour Rainfall (in)
2-Year	0.6
100-Year	1.5
Slope	0.45

5.5 Rational Method Hydrology

The overland times of concentration (To) were estimated for each tributary area using the overland flow length and elevation change, and then adjusted by Percent Impervious (Plate D.3). Travel times in the gutter were added to the adjusted initial times of concentration.

Copies of the Plates used for the above parameters are available in the Appendix.

6. Rational Method Hydrology

Peak flow rates (Q100) for the individual drainage areas were estimated using the tributary area (A, acres), the rainfall intensity (I, in./hr.) at the adjusted time of concentration, and the coefficient of runoff (C) adjusted for the rainfall intensity. These peak flow rates will be used to verify the public storm drain and curb inlets along the project frontage, and the flow depths, required curb openings, overflow sizing, and bypass flows for the proprietary treatment structures.

A summary of the peak flow rates is available in Exhibit A.

EXHIBIT A

RATIONAL METHOD SUMMARY

BAMIYAN MARKETPLACE

STREET FRONTAGE

AREA	DMA DESCRIPTION	TRIBUTARY AREA (SF)	IMPERV AREA (SF)	IMPERV. %	AREA (AC)	Lo (FT)	H (FT)	SLOPE (%)	To (MIN)	To' (MIN)	Lg (FT)	SLOPE (%)	Vg (FPS)	Tg (MIN)	Tc (MIN)	I-100 (IN/HR)	C	Q100 (CFS)
A	ORTEGA 1/2 STREET FRONTAGE	47,000	42,300	90%	1.08	40	0.8	2.0%	5	4.0	350	4.0%	5.5	1.06	5.1	4.7	0.89	4.51
B	GRAND AVE - SOUTH (1/2 STREET)	118,800	106,920	90%	2.73	40	1.0	2.5%	4.8	3.8	800	1.8%	3.7	3.60	7.4	4.0	0.89	9.71
C	GRAND AVE - NORTH (1/2 STREET)	85,000	76,500	90%	1.95	40	1.0	2.5%	4.8	3.8	800	1.0%	3.0	4.44	8.2	3.7	0.89	6.43
D	MACY STREET FRONTAGE	88,000	79,200	90%	2.02	30	1.5	5.0%	4.6	3.6	500	3.5%	5.0	1.67	5.3	4.6	0.89	8.27
	TOTAL				7.78													28.92

NOTE: FRONTAGE TRIBUTARY AREAS INCLUDE EXISTING STREET PAVING AND OFFSITE AREAS.

ONSITE DEVELOPMENT

AREA	DMA DESCRIPTION	DMA TOTAL AREA (SF)	DMA IMPERV AREA (SF)	IMPERV. %	AREA (AC)	Lo (FT)	H (FT)	SLOPE (%)	To (MIN)	To' (MIN)	Lg (FT)	SLOPE (%)	Vg (FPS)	Tg (MIN)	Tc (MIN)	I-100 (IN/HR)	C	Q100 (CFS)
1	AM/PM TO C.I. AT CORNER PAST PUMPS	42,863	33,833	79%	0.98	140	1.0	6.2%	7.6	6.2					7.6	3.9	0.87	3.34
2	REST-1 ACROSS FROM CAR WASH	10,854	6,150	57%	0.25	20	0.5	2.5%	5.5	5.2	60	1.5%	3.5	0.3	5.8	4.4	0.86	0.94
3	CAR WASH AND PARKING AND PUMP AREA	35,948	30,884	86%	0.83	70	1.4	2.0%	5.2	4.3					5.2	4.6	0.87	3.30
4	CAR WASH RECYCLED WATER AT EXIT	854	854	100%	0.02										4.0	4.7	0.88	0.08
5	ORTEGA ENTRANCE DRIVE AND BEHIND CAR WASH	39,105	18,150	46%	0.90	40	1.0	2.5%	6.5	5.2	340	1.0%	3.0	1.9	8.4	3.7	0.87	2.89
6	CAR WASH LOW END	9,547	6,269	66%	0.22	60	0.9	1.5%	5.8	5.6					5.8	4.4	0.87	0.84
7	TRUCK ROAD BEHIND MIXED USE BUILDING	39,071	26,208	67%	0.90	40	0.6	1.5%	6.2	4.6	270	1.0%	3.0	1.5	7.7	3.9	0.89	3.11
8	COVERED PARKING	13,340	10,810	81%	0.31	60	1.2	2.0%	5.3	4.5	70	1.5%	3.5	0.3	5.6	4.5	0.87	1.20
9	RESTAURANT-2 ACROSS FROM MIXED USE	7,842	5,990	76%	0.18	50	1.0	2.0%	5.4	4.8	50	1.0%	3.0	0.3	5.7	4.5	0.87	0.70
10	MAIN DRIVE AISLE BETWEEN RESTAURANTS AND MIXED USE	47,985	46,252	96%	1.10	50	1.0	2.0%	5.2	3.9	170	1.5%	3.5	0.8	6.0	4.3	0.89	4.22
11	IN FRONT OF RES ENTRANCE	17,556	9,752	56%	0.40	70	1.0	1.4%	5.5	5.1	50	1.0%	3.0	0.3	5.8	4.4	0.87	1.54
12	TRUCK ROAD AND RES. ENTRANCE	24,916	10,970	44%	0.57	35	0.9	2.6%	5	4.7	210	1.0%	3.0	1.2	6.2	4.3	0.87	2.14
13	SECOND ON TRUCK FROM MACY	11,974	4,557	38%	0.27	35	0.9	2.6%	5	4.8	130	1.0%	3.0	0.7	5.7	4.4	0.87	1.05
14	MACY STREET ENTRANCE DRIVE	8,268	4,097	50%	0.19	50	1.0	2.0%	5.2	4.6					5.2	4.6	0.88	0.77
15	RESIDENTIAL AREA	176,108	123,924	70%	4.04	50	0.5	1.0%	5.7	5.3	240	1.0%	3.0	1.3	7.0	4.0	0.87	14.07
	TOTAL				11.16													40.20

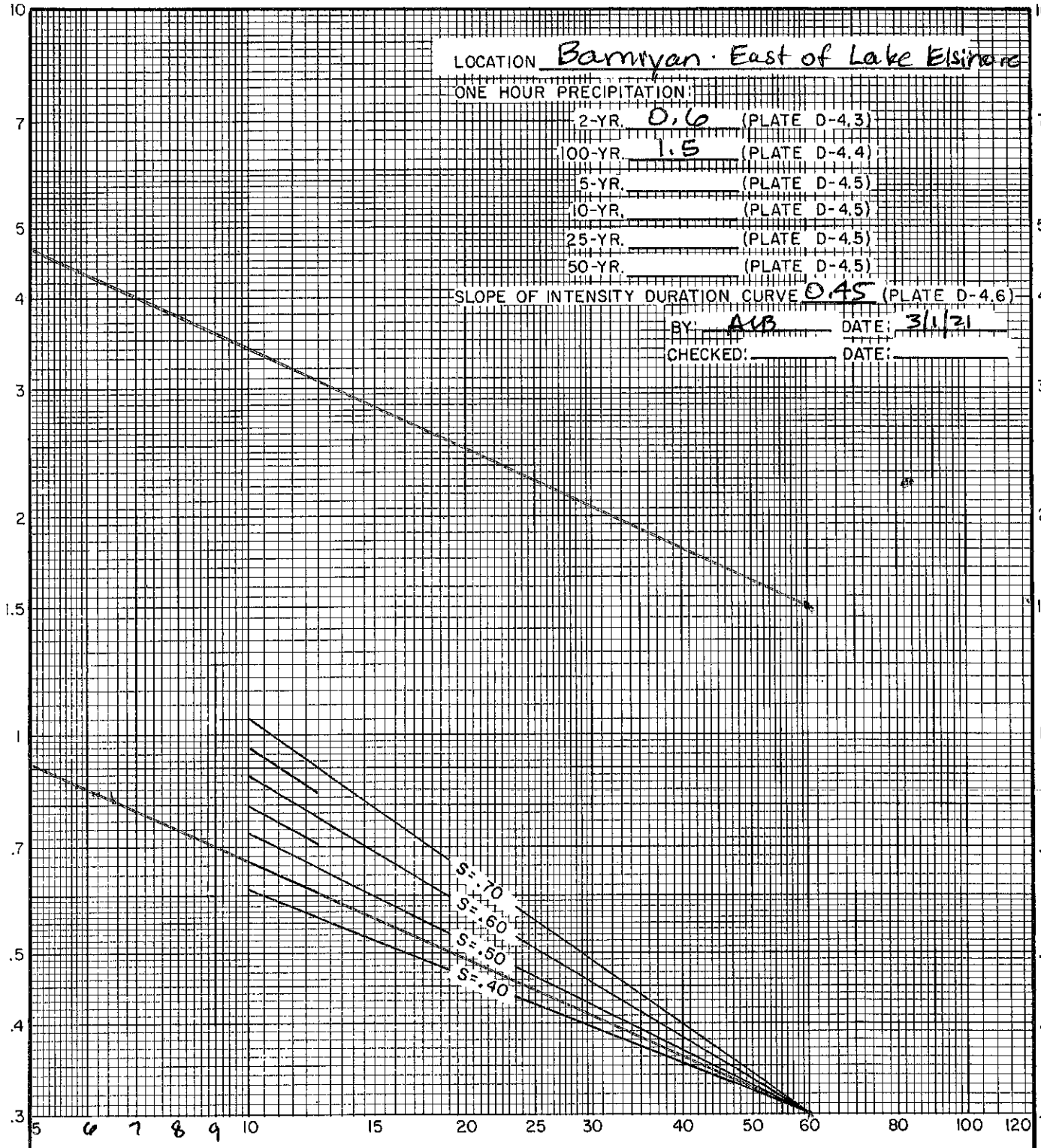
NOTE: AREAS 5, 7, 11,12,13, & 14 INCLUDE REAR SLOPE AREAS

EXHIBIT B

CURB INLET CALCULATIONS

APPENDIX

RCFC & WCD Plates

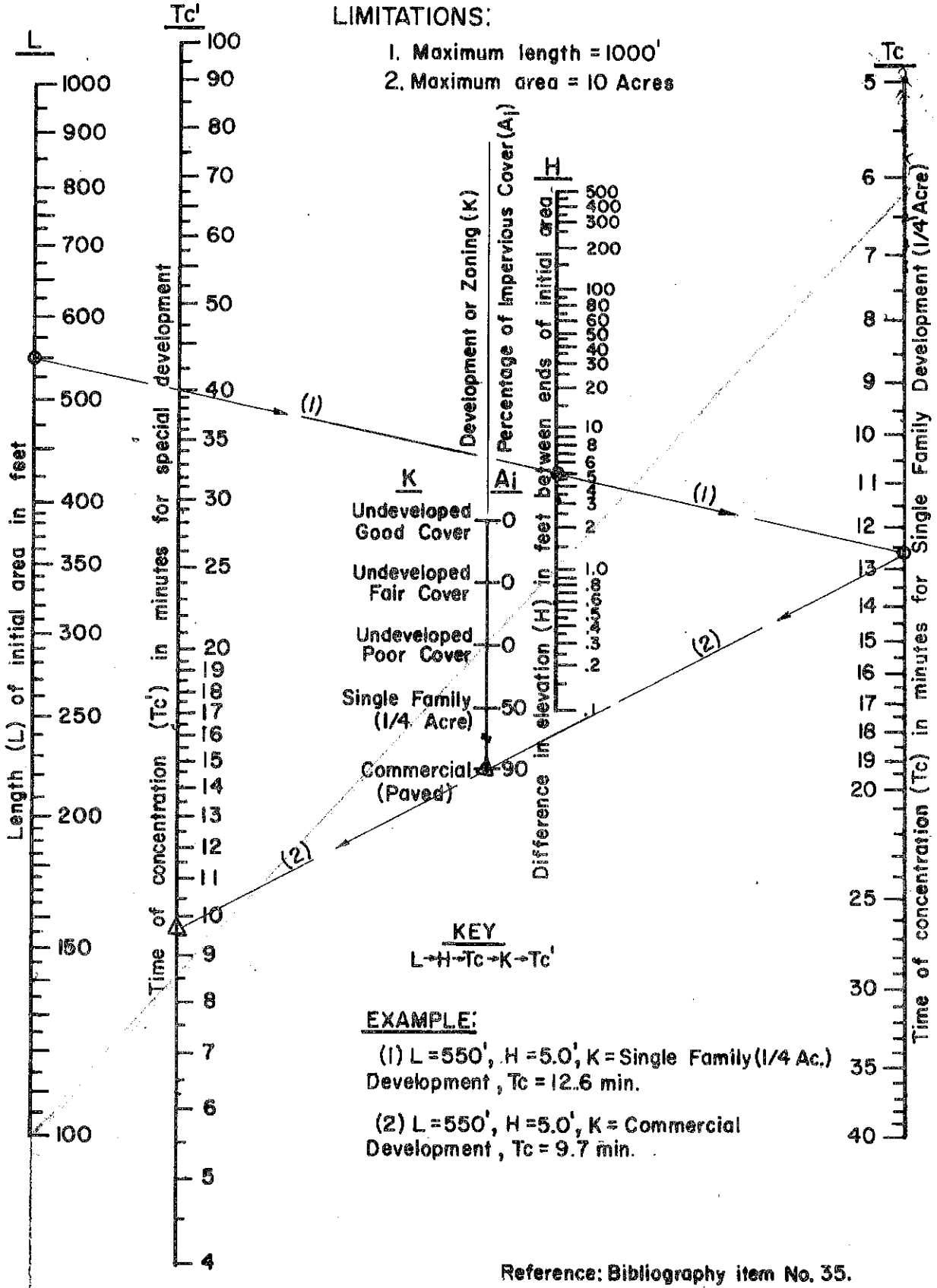


RCFC & WCD

HYDROLOGY MANUAL

INTENSITY – DURATION CURVES CALCULATION SHEET

PLATE D-4.7

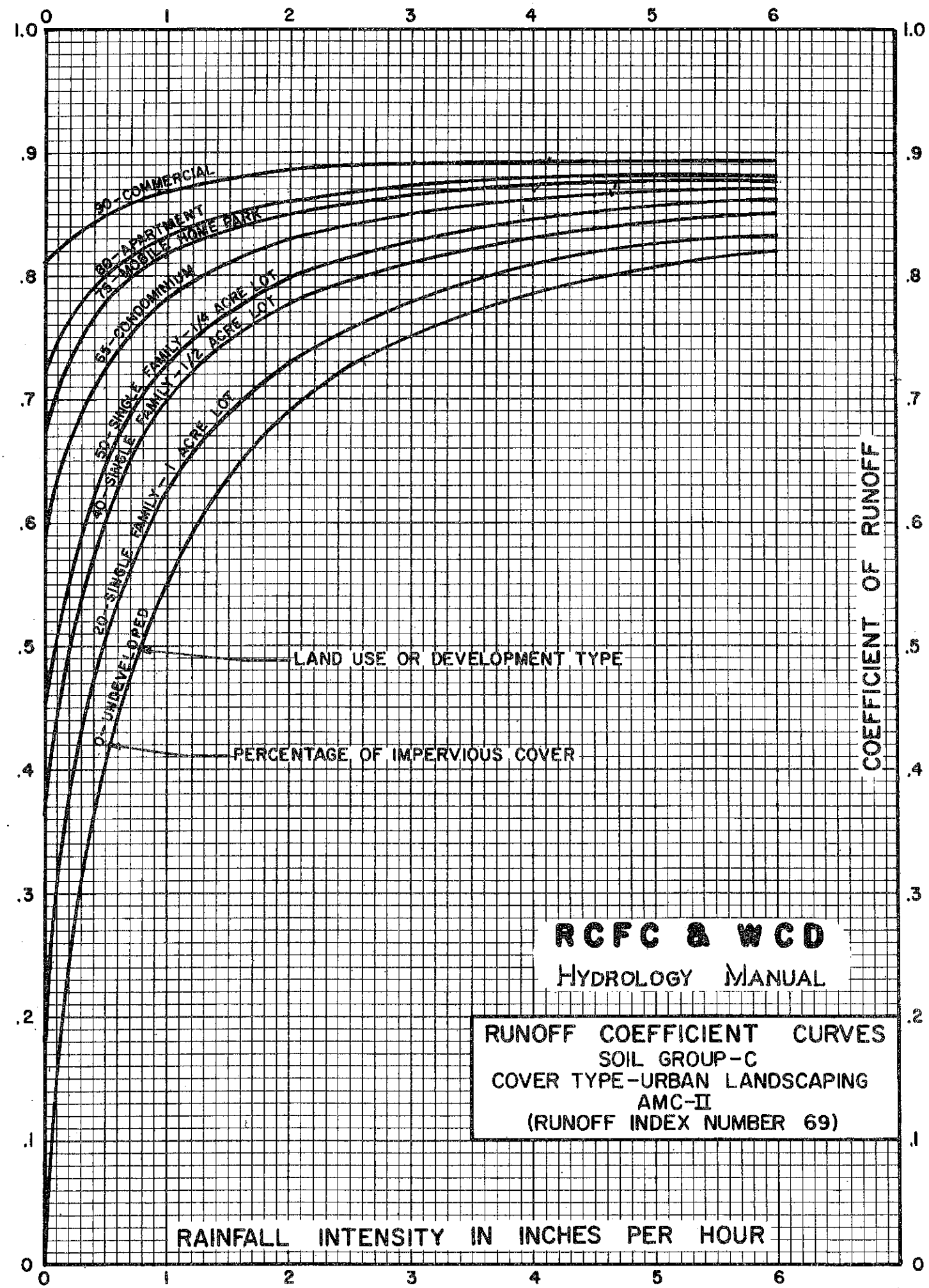


Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION FOR INITIAL SUBAREA

PLATE D-3

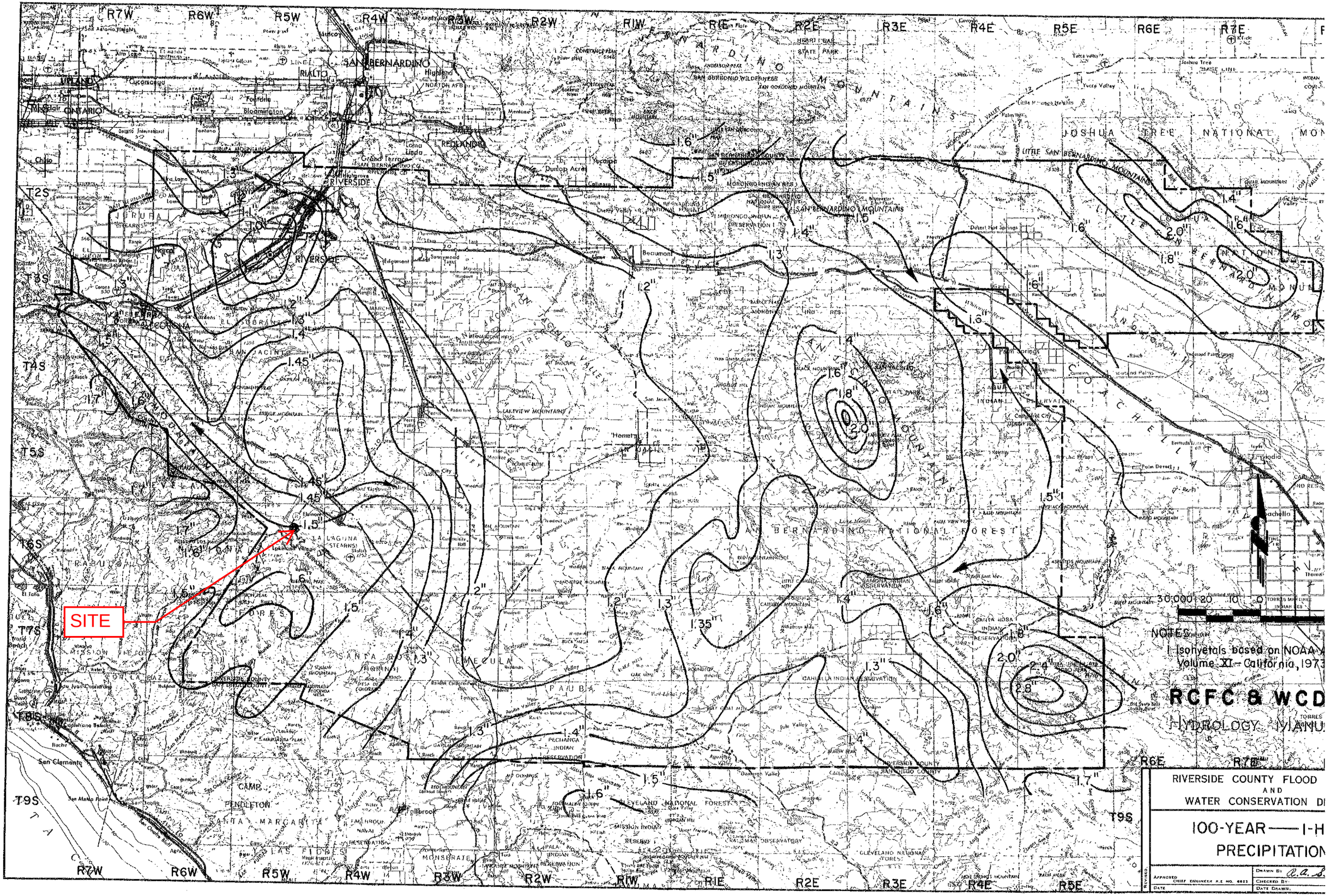


RCFC & WCD

HYDROLOGY MANUAL

RUNOFF COEFFICIENT CURVES
SOIL GROUP-C
COVER TYPE-URBAN LANDSCAPING
AMC-II
(RUNOFF INDEX NUMBER 69)

PLATE D-5.3


SITE
SAN BERNARDINO
RIVERSIDE
RIALTO
REDLANDS
ONTARIO
UPLAND
JOSHUA TREE NATIONAL MON
SAN BERNARDINO MOUNTAINS
SAN GORGONIO WILDERNESS
SAN GORGONIO MOUNTAIN
SAN BERNARDINO NATIONAL FOREST
LITTLE SAN BERNARDINO MOUNTAINS
MORONGO INDIAN RES
SANTA ROSA MTNS
TEMECULA
PAUBA
PECHANGA INDIAN RESERVATION
CAHUILLA INDIAN RESERVATION
SANTA MARGARITA
CAMP PENDLETON
CLEVELAND NATIONAL FOREST
SAN JACINTO FAULT
SAN JACINTO VALLEY
SAN JACINTO MOUNTAINS
LAKEVIEW MOUNTAINS
SAN JACINTO
HEMET
BANNING
BEAUMONT
PALM SPRINGS
DESERT HOT SPRINGS
COACHELLA
INDIO
SAN CLEMENTE
MISSION VIEJO
LAGUNA HILLS
TRABUCO
SANTA ANA MTNS
R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E
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NOTES
Isohyetals based on NOAA
Volume XI - California, 1973
RCFC & WCD
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CHECKED BY
DATE DRAWN
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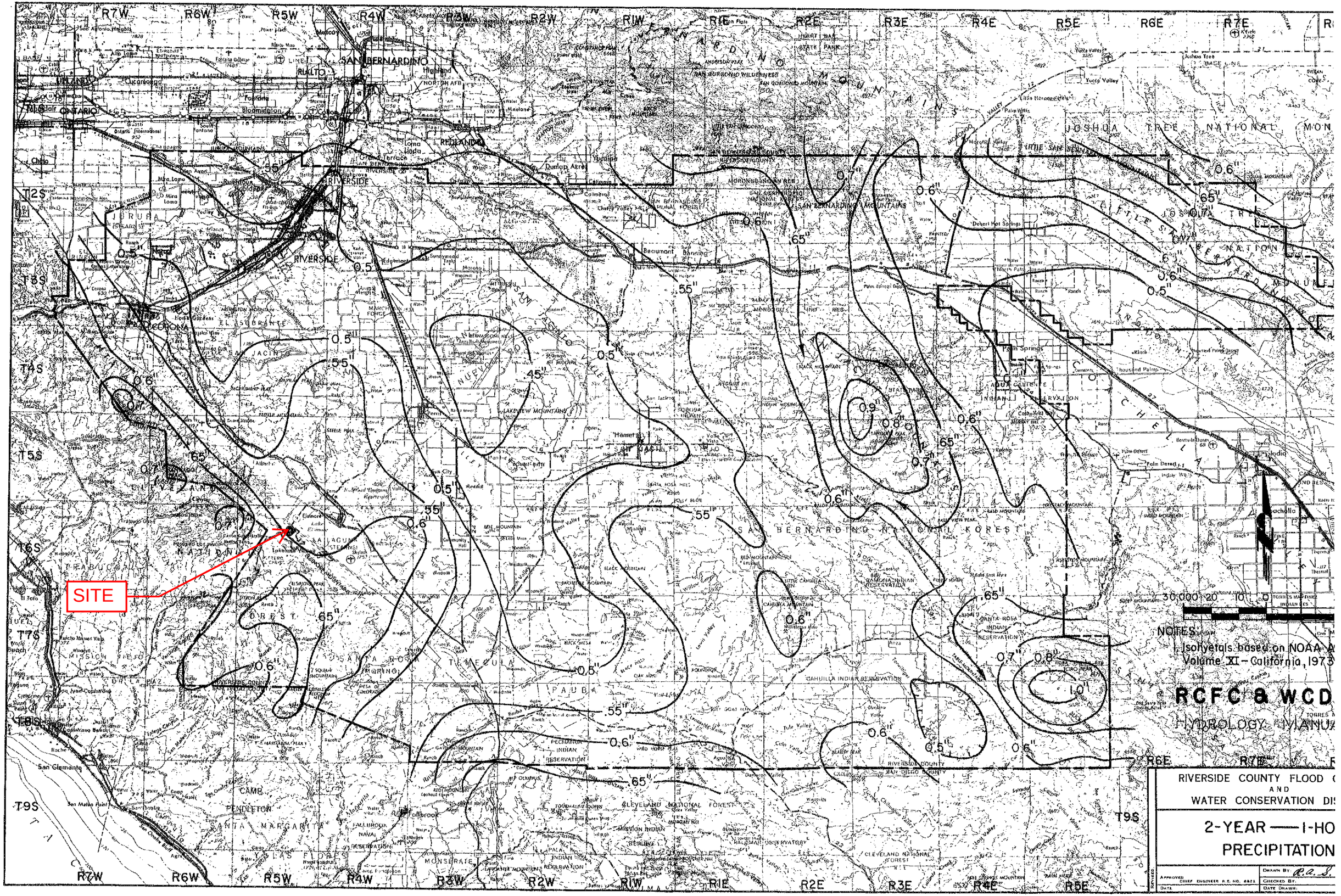
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1.0"
.45"
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NOTES
Isohyetals based on NOAA A
Volume XI – California, 1973
RCFC & WCD
HYDROLOGY MANUA
RIVERSIDE COUNTY FLOOD
AND
WATER CONSERVATION DI
2-YEAR — 1-HO
PRECIPITATION
Drawn By
Checked By
Date Drawn
PLATE

R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E

T2S T3S T4S T5S T6S T7S T8S T9S

.50 .55 .55 .55 .58 .60 .63 .50 .55 .50 .55 .45 .50 .55 .59 .55

SAN BERNARDINO MOUNTAINS

JOSHUA TREE NATIONAL MONUMENT

SAN JACINTO MOUNTAINS

SAN BERNARDINO NATIONAL FOREST

SITE

NOTES

1. Slope of Intensity-Duration Cu
on District analysis of automat
recording rain gage records.

RCFC & WCD

HYDROLOGY MANUA

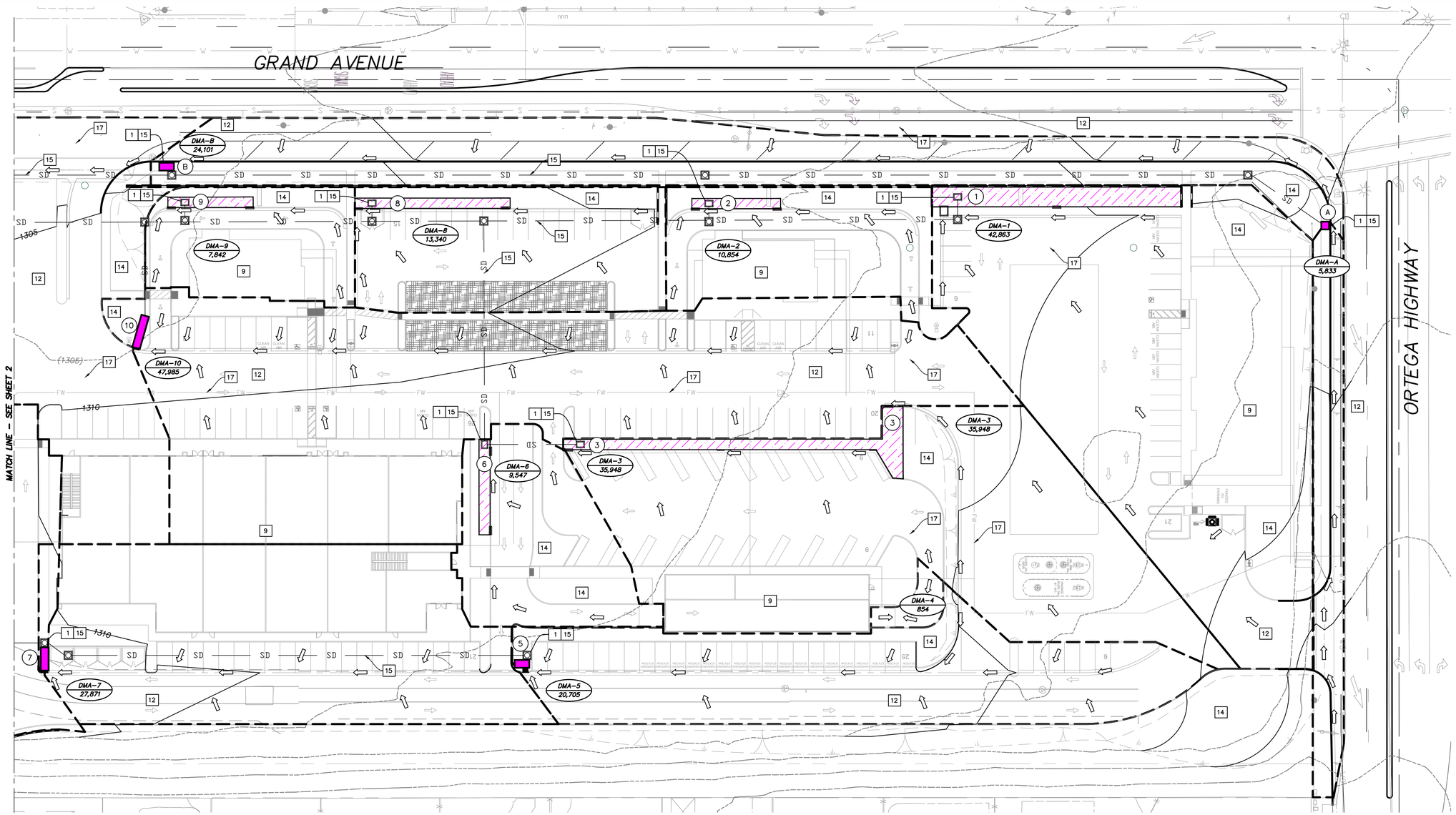
RIVERSIDE COUNTY FLOOD CO
AND
WATER CONSERVATION DIST

SLOPE OF
INTENSITY DURAT
CURVE

APPROVED CHIEF ENGINEER R.E. NO. 6822	DRAWN BY R.A.S.
DATE	CHECKED BY
	DATE DRAWN

REVISED

PLATE



SOURCE CONTROL NOTES

1. NON-STORMWATER DISCHARGES (SC-10)
2. SPILL PREVENTION, CONTROL & CLEANUP (SC-11), SITE-WIDE
3. VEHICLE AND EQUIPMENT FUELING (SC-20)
4. VEHICLE AND EQUIPMENT CLEANING (SC-21)
5. OUTDOOR LOADING/UNLOADING (SC-30), SITE-WIDE
6. OUTDOOR CONTAINER STORAGE (SC-31), SITE-WIDE
7. OUTDOOR EQUIPMENT MAINTENANCE (SC-32), SITE-WIDE
8. WASTE HANDLING/DISPOSAL (SC-34), SITE-WIDE
9. BUILDING & GROUNDS MAINTENANCE (SC-41), SITE-WIDE
10. PARKING/STORAGE AREA MAINTENANCE (SC-43), SITE-WIDE
11. HOUSEKEEPING PRACTICES (SC-60), SITE-WIDE
12. ROAD/STREET MAINTENANCE (SC-70), SITE-WIDE
13. PLAZA/SIDEWALK CLEANING (SC-71), SITE-WIDE
14. LANDSCAPE MAINTENANCE (SC-73), SITE-WIDE
15. DRAINAGE SYSTEM MAINTENANCE (SC-74), SITE-WIDE
16. WASTE HANDLING & DISPOSAL (SC-75), SITE-WIDE
17. WATER & SEWER UTILITY MAINTENANCE (SC-76), SITE-WIDE

LEGEND

- DMA-A 41,067 — Drainage Subarea; Subarea (FT²)
- (1) — BMP ID
- DRAINAGE AREA BOUNDARY
- MODULAR WETLAND
- BIORETENTION BASIN
- FLOW ARROWS

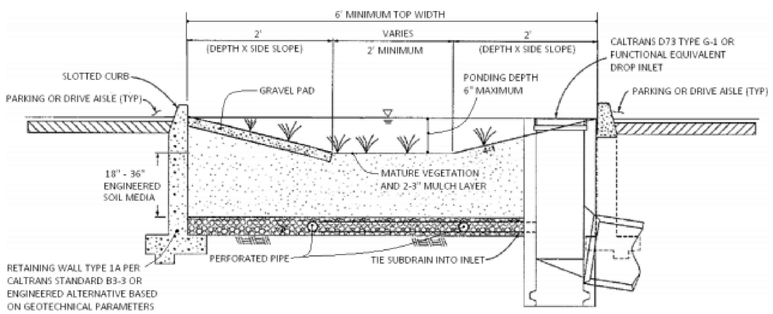
STREET FRONTAGE

DMA ID	REQUIRED CAPACITY (CFS)	PROPOSED CAPACITY (CFS)	BIOCLEAN MWS UNIT
A	0.022	0.052	MWS-L-4-4
B	0.085	0.115	MWS-L-4-8
C	0.193	0.206	MWS-L-4-17
D	0.025	0.052	MWS-L-4-4

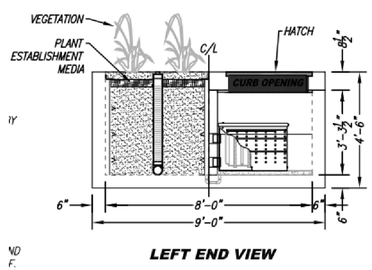
ONSITE DEVELOPMENT

DMA ID	DCV, V_{BMP} (CF)	PROPOSED VOLUME (CF)	REMAINING (CF)
1	2,692	2,805	---
2	513	515	---
3	2,433	2,640	---
4	66	SELF RETAINING	---
5	1,426	N/A	MWS-L-4-8
6	511	520	---
7	2,044	N/A	MWS-L-4-13
8	857	899	---
9	479	503	---
10	3,598	N/A	MWS-L-4-19
11	792	850	---
12	889	932	---
13	382	383	---
14	328	380	---
15	10,009	10,255	---

NOTE: ALL CATCH BASINS TO HAVE FULL TRASH CAPTURE DEVICES.

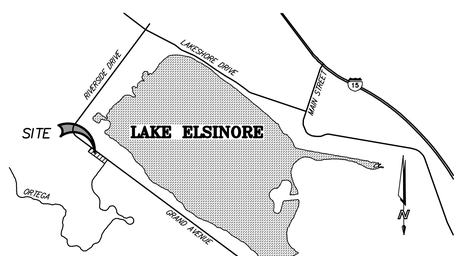


A **TYP. PARKING LOT BIORETENTION PLANTER**
NO SCALE

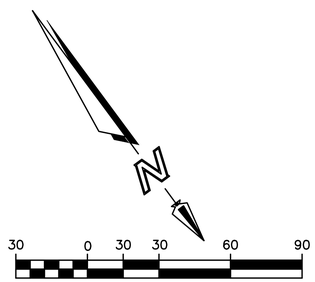


LEFT END VIEW

B **TYP. BIOCLEAN MODULAR WETLAND**
NO SCALE



VICINITY MAP
THOMAS GUIDE REF.:
PAGE 865, GRID J6, J7, H6, H7
NOT TO SCALE



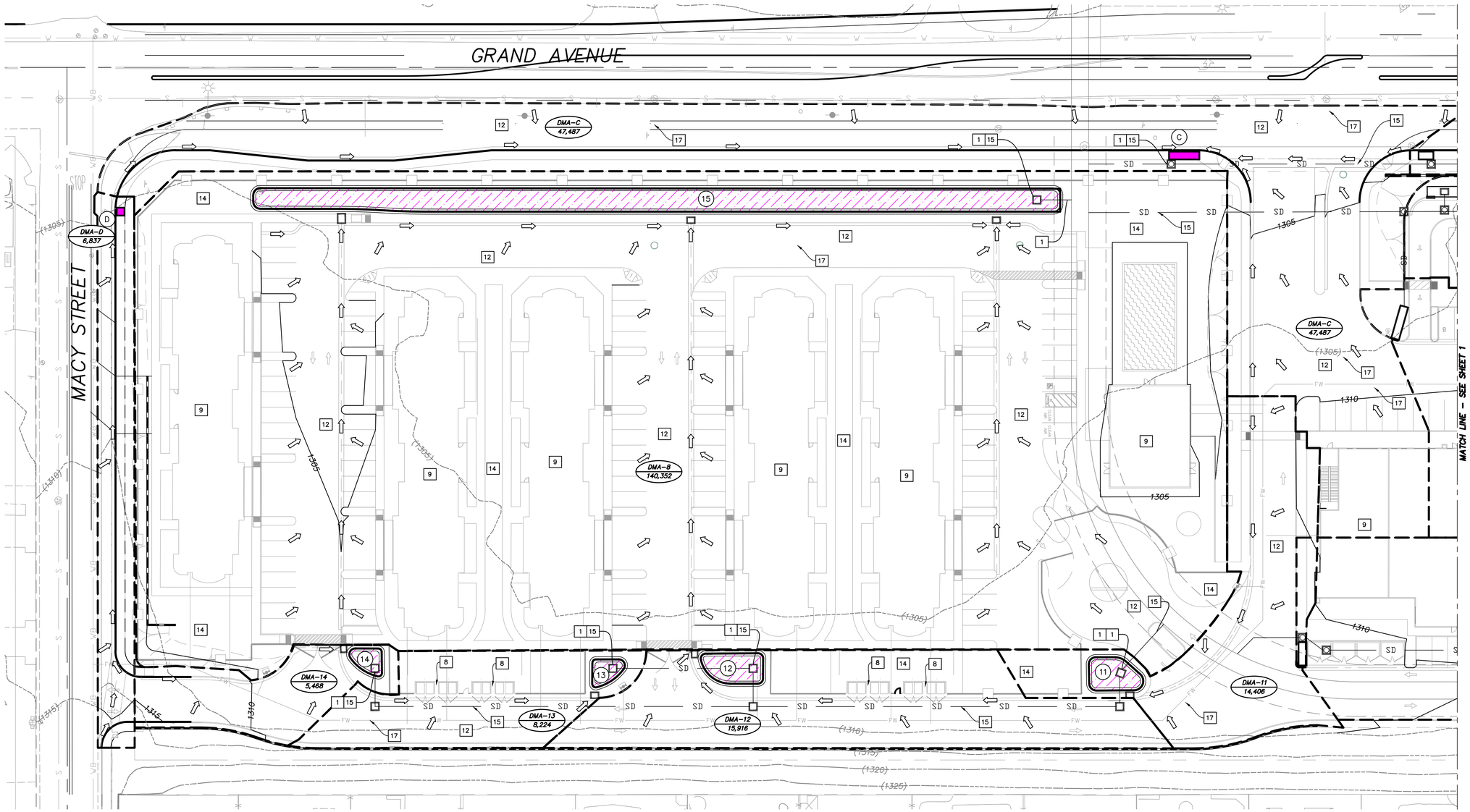
REGISTERED PROFESSIONAL ENGINEER — STEPHEN C. OTT — No. C70666 — CIVIL — STATE OF CALIFORNIA

SB&O INC.
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
858-560-1141
858-560-8157 Fax

STEPHEN C. OTT DATE

SHEET 1 | CITY OF LAKE ELSINORE | SHEETS 2

WQMP SITE PLAN
APN 381-320-020/023
BAMIYAN MARKETPLACE
CITY OF LAKE ELSINORE, CA



NOTE: ALL CATCH BASINS TO HAVE FULL TRASH CAPTURE DEVICES.

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- 1 — BMP ID
- DRAINAGE AREA BOUNDARY
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- BIORETENTION BASIN
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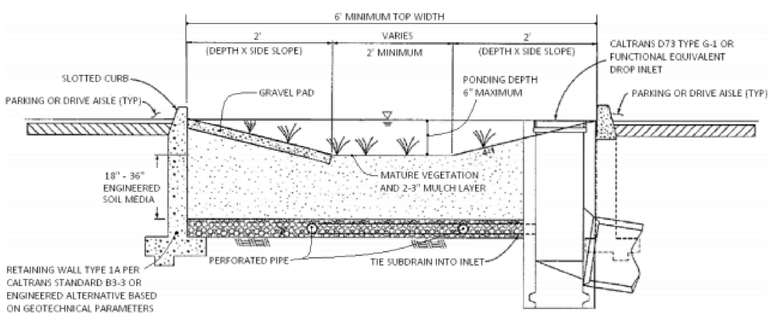
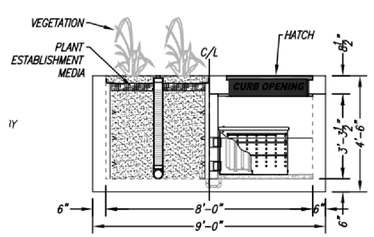
ONSITE DEVELOPMENT

DMA ID	DCV, V_{BMP} (CF)	PROPOSED VOLUME (CF)	REMAINING (CF)
1	2,692	2,805	---
2	513	515	---
3	2,433	2,640	---
4	66	SELF RETAINING	---
5	1,426	N/A	MWS-L-4-8
6	511	520	---
7	2,044	N/A	MWS-L-4-13
8	857	899	---
9	479	503	---
10	3,598	N/A	MWS-L-4-19
11	792	850	---
12	889	932	---
13	382	383	---
14	328	380	---
15	10,009	10,255	---

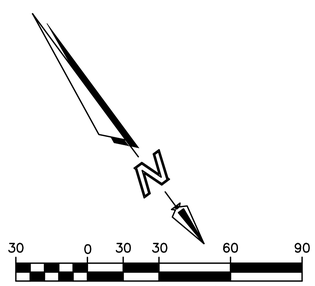


A **TYP. PARKING LOT BIORETENTION PLANTER**
NO SCALE



LEFT END VIEW

B **TYP. BIOCLEAN MODULAR WETLAND**
NO SCALE



SCALE: 1"= 30'

SB&O INC.
PLANNING ENGINEERING SURVEYING
3990 Ruffin Road, Suite 120
San Diego, Ca. 92123
858-560-1141
858-560-8157 Fax

REGISTERED PROFESSIONAL ENGINEER — STEPHEN C. OTT — No. C70666 — CIVIL — STATE OF CALIFORNIA

STEPHEN C. OTT DATE

SHEET 2 | CITY OF LAKE ELSINORE | SHEETS 2

WQMP SITE PLAN-CONT.
APN 381-320-020/023
BAMIYAN MARKETPLACE
CITY OF LAKE ELSINORE, CA