FEBRAURY 2013

PRELIMINARY HYDROLOGY STUDY

FOR
EAGLE RIDGE MARKET
STATE LANE AND HIGHWAY 18
IN
ERWIN LAKE, CALIFORNIA
(A.P.N. 0351-231-17)
15

FOR

STEENO DESIGN STUDIO
11774 HESPERIA ROAD, SUITE B1
HESPERIA, CA 92345
760-244-5001

BY
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P.O. BOX 1861
APPLE VALLEY, CA 92307
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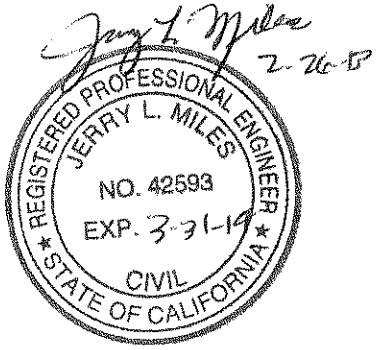


PURPOSE

This off-site and on-site drainage evaluation was prepared for submittal of a site plan approval submittal package for the proposed Eagle Ranch Market at the southeast corner of State Highway 38 and State Lane in Erwin Lake. This evaluation is being performed to determine if off-site drainage flows that will affect the proposed development and provide a preliminary drainage evaluation for the proposed on-site facilities. All of the developed 100-year on-site generated drainage flows will be retained on-site.

DESCRIPTION OF DRAINAGE AREAS

The subject lot is located at the southeast corner of State Highway 38 State Lane in Erwin Lake. The subject site is irregularly shaped and is approximately 0.9 net acres in size. The site is located near the top of a small ridge with moderately sloping to the northwest.

A field evaluation showed that no off-site natural drainage courses cross the site (see attached Aerial Photo and Off-Site Drainage Area Map). Most of the drainage flows collect along the northeastern site of the state highway and is directed to a culvert that crosses under State Lane. Developed land to the southeast collect on the southeast side of the highway and conducted to a culvert at the intersection. Therefore, little to no off-site flow enters the subject site.

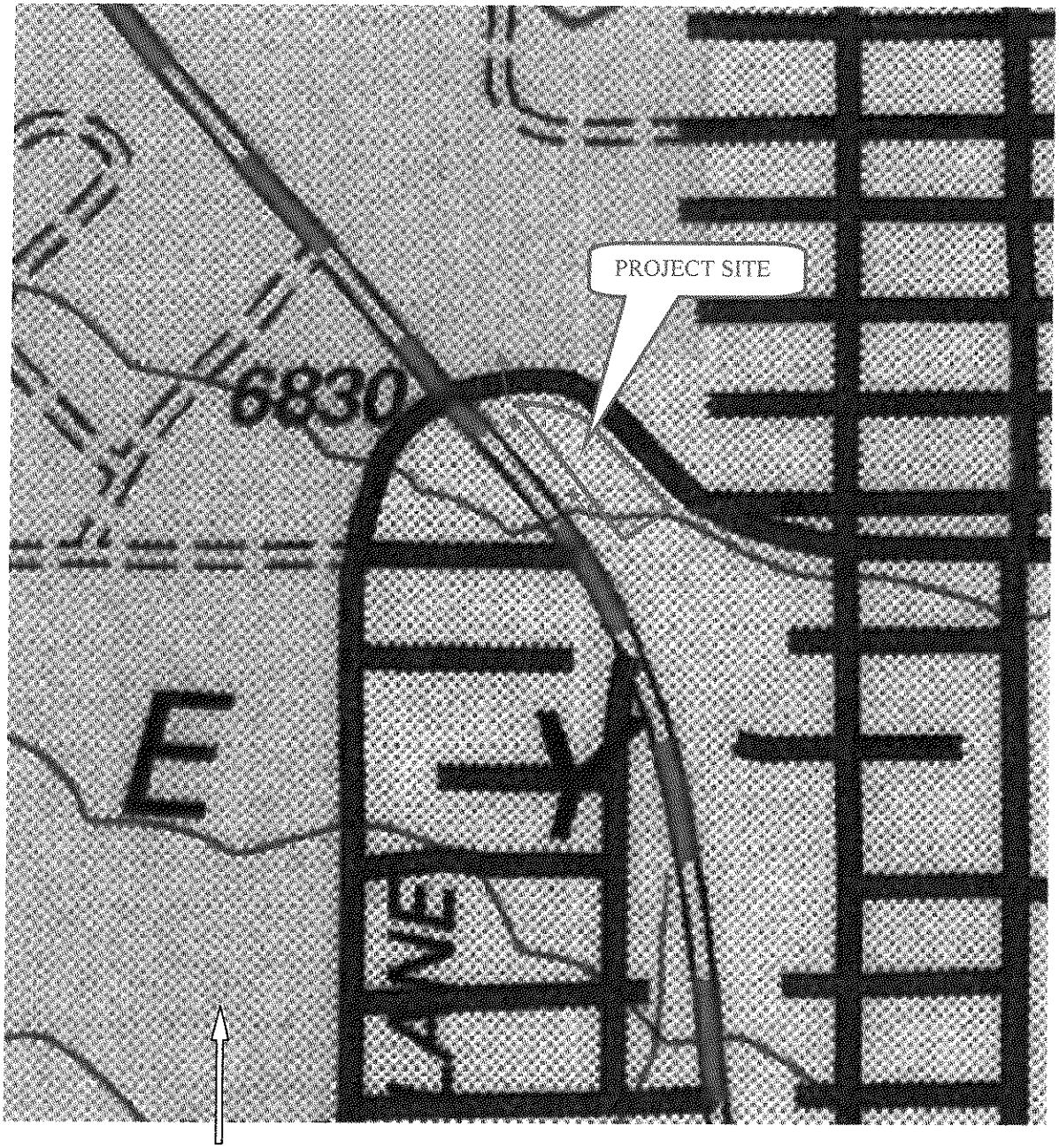
DESCRIPTION OF ON-SITE WATERSHED

The existing site slopes moderately to the northwest and is vacant and undeveloped. The proposed development type will be commercial. The on-site watershed was assumed to have a soil Type "C" per the San Bernardino County Hydrology Manual. The proposed building pads will be elevated above the surrounding proposed driveways and the property adjacent to the state highway. A drainage swale along the rear of the building will conduct any off-site flows trying to enter the site northwesterly to the culvert under State Lane. Drainage swales will be constructed to conduct drainage flows to a storm drain inlet near the northwesterly corner of the proposed site, maintaining the natural pattern of drainage (see attached On-Site Drainage Area Map). Preliminary retention volumes were determined using a simplified hydrograph method. The proposed retention basin capacities exceed the calculated retention volumes generated by collect all of the 100-year on-site drainage flows. A final hydrology study will be needed to establish the exact on-site drainage facilities and the required retention volumes.

SUMMARY

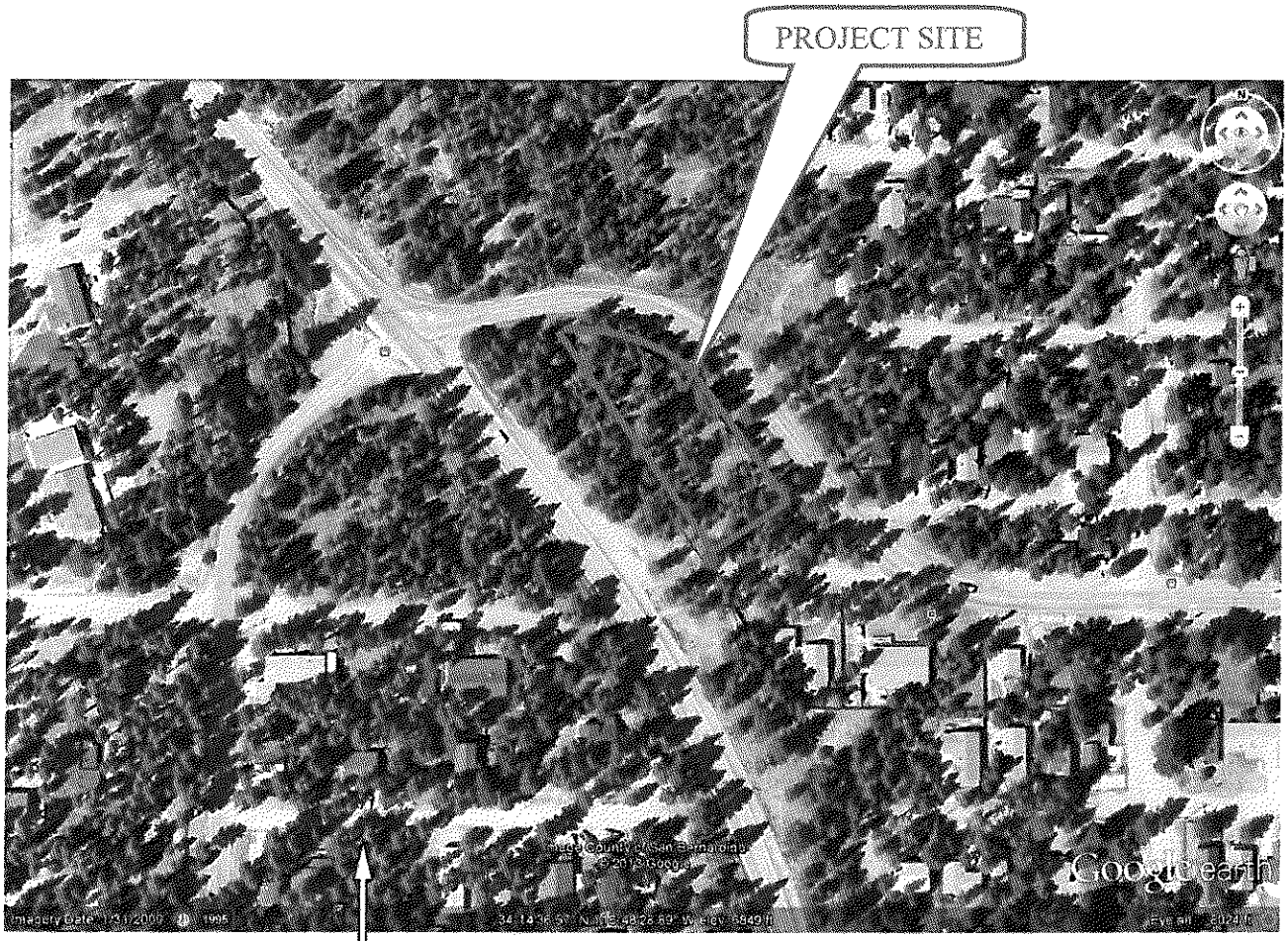
It was determined that off-site drainage flows do not enter the site and the proposed driveway and a drainage swale behind the building will assist in conducting off-site flows northwesterly prior to entering the site. All on-site drainage flows will be collected and directed to an underground retention basin. On-site retention volumes were established by assuming the collection of all on-site 100-year drainage flows and the retention basin capacities exceed those retention volume requirements.

OFF-SITE DRAINAGE AREA MAP



EAGLE RIDGE MARKET
STATE LANE & HWY 138, ERWIN LAKE, CA
A.P.N. 0315-231-17

AERIAL PHOTO



EAGLE RIDGE MARKET
STATE LANE & HWY 138, ERWIN LAKE, CA
A.P.N. 0315-231-17

ON-SITE DRAINAGE CALCULATIONS

SEE LAST
PAGE SCANNED
ONSITE DRNG MAP

RATIONAL METHOD STUDY FORM APN 0315-231-17

SAN BERNARDINO COUNTY HYDROLOGY MANUAL

STUDY NAME: EAGLE RIDGE MARKET

10 -YEAR STORM 1-HOUR RAINFALL (INCH)= 1.00 ; SLOPE = 0.70

Calculated by JLM Date 2/18/13

Checked by _____ Date _____

Page 1 of 2

Concentration Point	Area (Acres) Subarea	Area (Acres) Total	Soil Type	Dev. Type	T_t min.	T_c min.	I in/hr	Fm in/hr	Fm avg.	Q Total	Flow Path Length ft.	Slope ft./ft.	V ft./sec.	Hydraulics and Notes
EXIST (1)	0.80	0.80	'C'	VN-DEV		15	2.30	0.57	0.57	1.23 cfs				
											375	0.029	—	INITIAL SUB-AREA
PROPOSED (1)	0.80	0.80	'C'	COM		6	4.30	0.09	0.09	3.03 cfs				
											360	0.028	—	INITIAL SUB-AREA

D-16

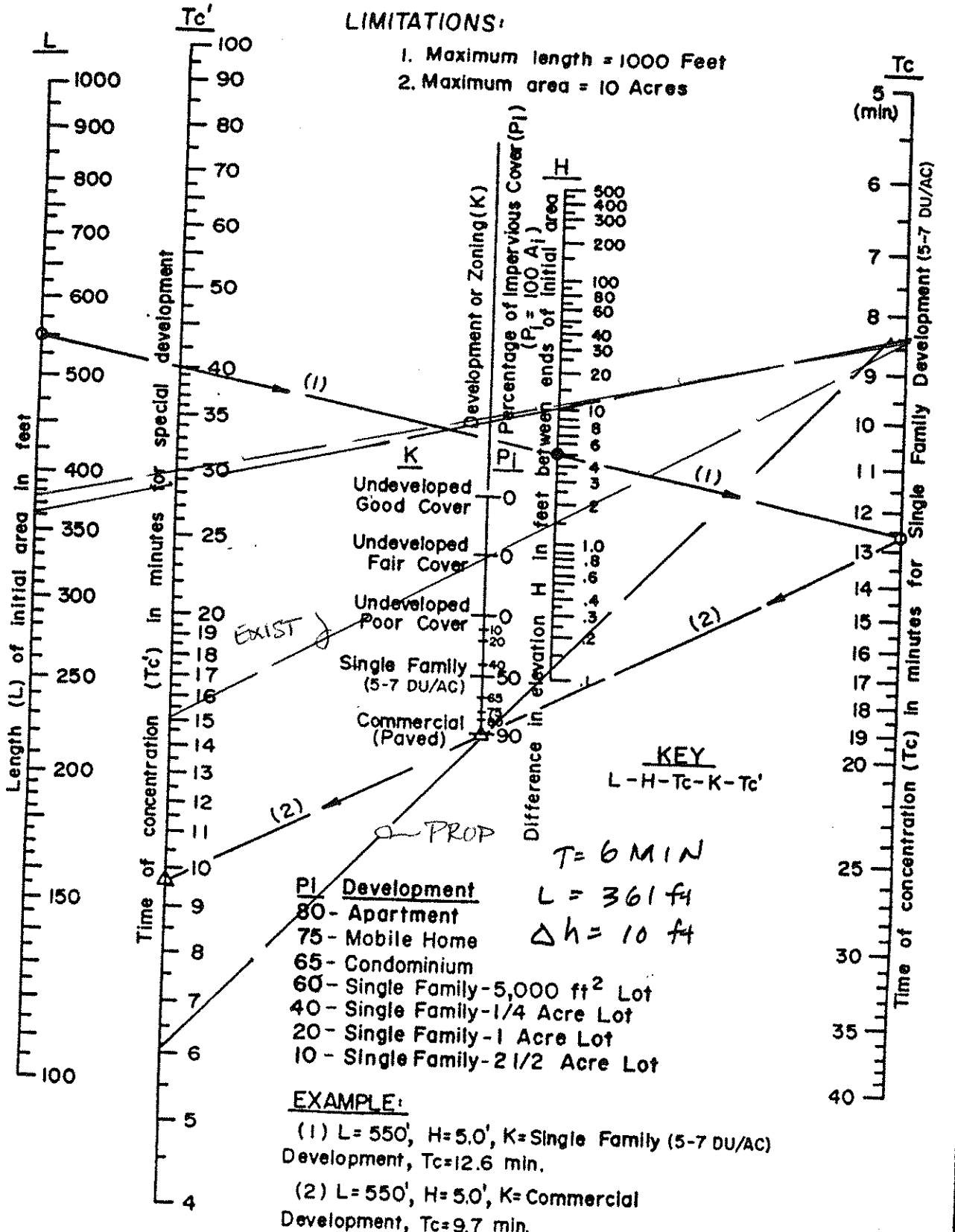
Figure D-6

RATIONAL METHOD STUDY FORM APN 0315-231-17

SAN BERNARDINO COUNTY HYDROLOGY MANUAL	STUDY NAME: EAGLE RANCH MARKET 100-YEAR STORM 1-HOUR RAINFALL (INCH)= 1.50 ; SLOPE = 0.70	Calculated by JLM Date 2/19/13 Checked by _____ Date _____ Page 2 of 2

Concentration Point	Area (Acres) Subarea	Area (Acres) Total	Soil Type	Dev. Type	T_t min.	T_c min.	I in/hr	Fm in/hr	Fm avg.	Q Total	Flow Path Length ft.	Slope ft./ft.	V ft./sec.	Hydraulics and Notes
EXIST (1)	0.80	0.80	'C'	UN DEV		15	3.9	0.27	0.27	2.61 cfs				
											375	0.029	—	INITIAL SUB-AREA
PROPOSED (1)	0.80	0.80	'C'	COM		6	7.4	0.04	0.04	5.30 cfs				
											360	0.022	-	INITIAL SUB AREA

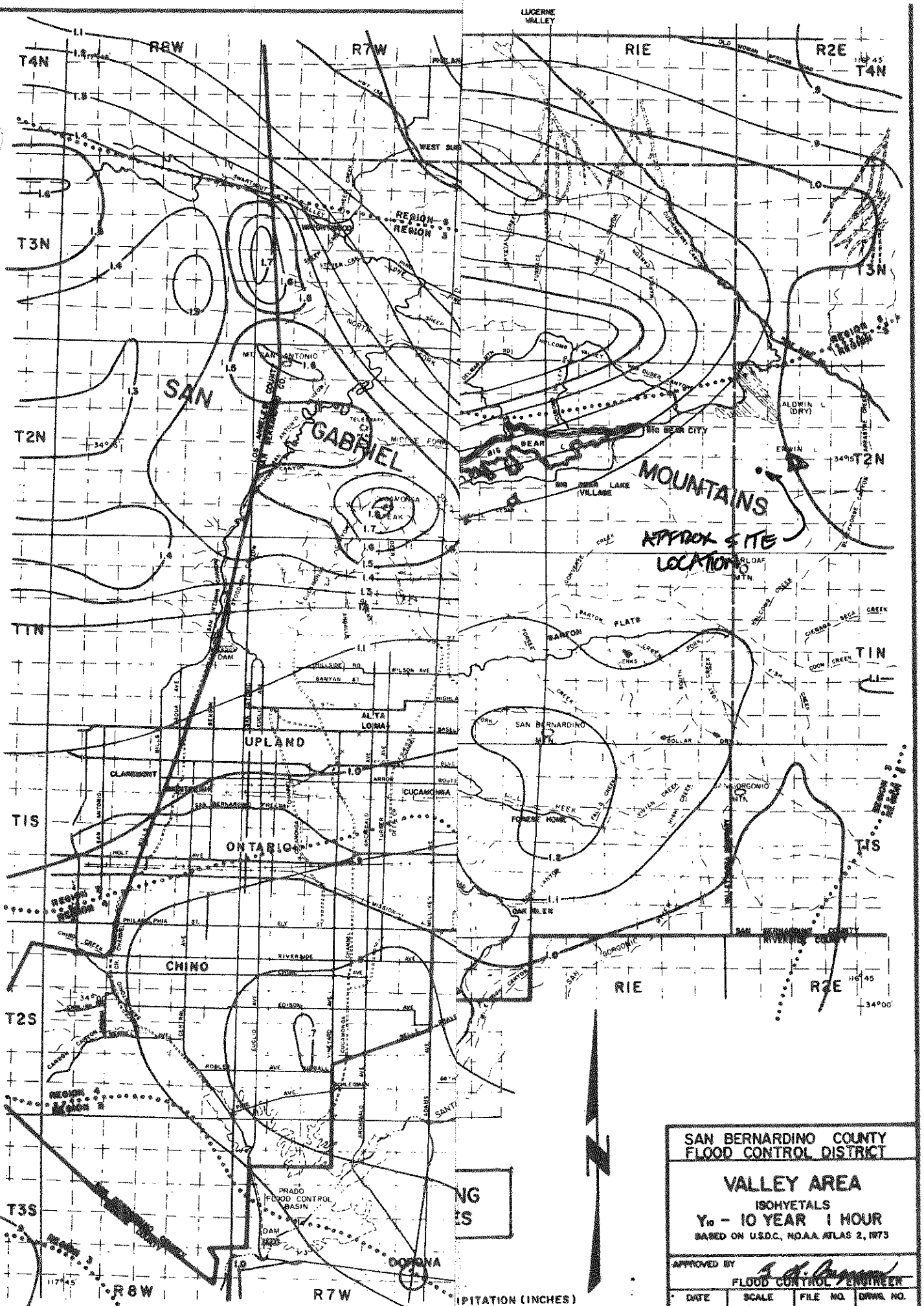
Figure D-6



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1



SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA

ISOHYETALS

Y_{10} - 10 YEAR 1 HOUR

BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY _____
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.	WRD-1	3 of 12

...IPITATION (INCHES)

FIGURE B-2

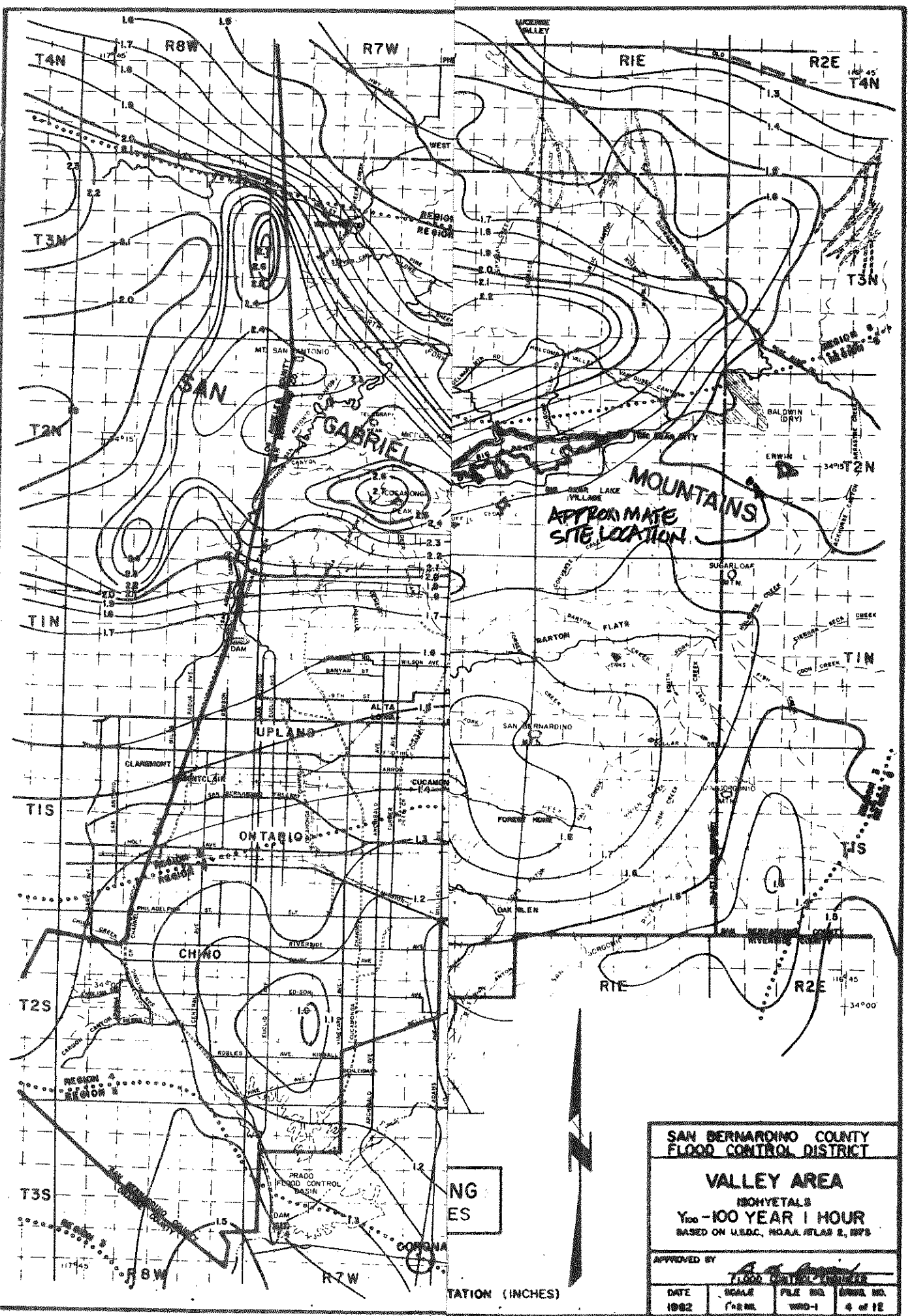
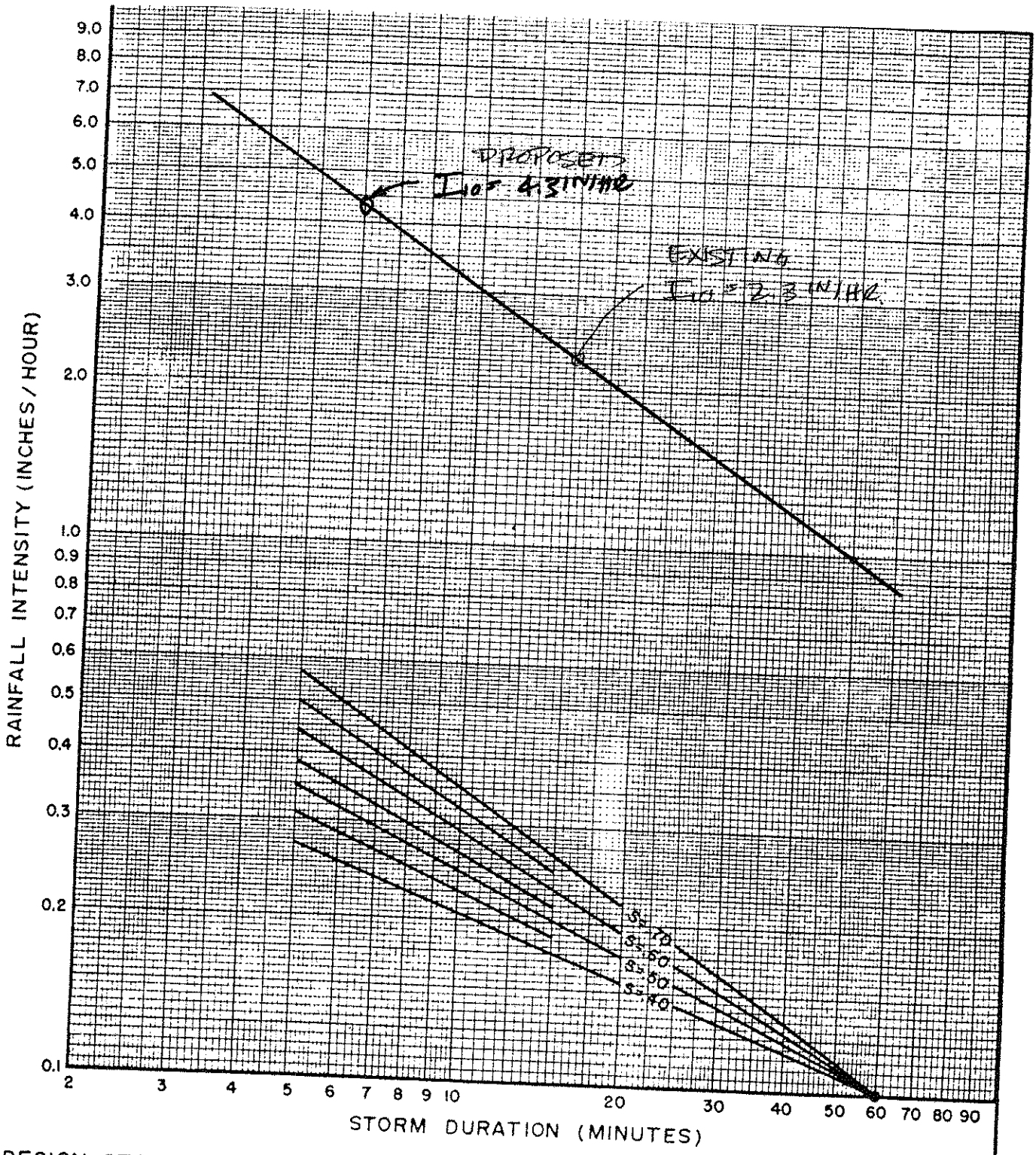

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 -100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE
1982
SCALE
1"=2 MI.
FILE NO.
WRD-1
DRWG. NO.
4 of 12
APPROXIMATE SITE LOCATION
SAN GABRIEL MOUNTAINS
UPLAND
ONTARIO
CHINO
CLAREMONT
MONTCLAIR
ALTA LOMA
CUCAMONGA
SAN BERNARDINO
FOREST HOME
OAK GLEN
BARTON FLATS
SUGARLOAF MTN.
BALDWIN L. (DRY)
ERWIN L.
MT. SAN ANTONIO
COCAMONGA PEAK
PRADO FLOOD CONTROL BASIN
CORONA
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R1E
R2E
TATION (INCHES)

FIGURE B-4



DESIGN STORM FREQUENCY = 10 YEARS

ONE HOUR POINT RAINFALL = 1.0 INCHES

LOG-LOG SLOPE = 0.70

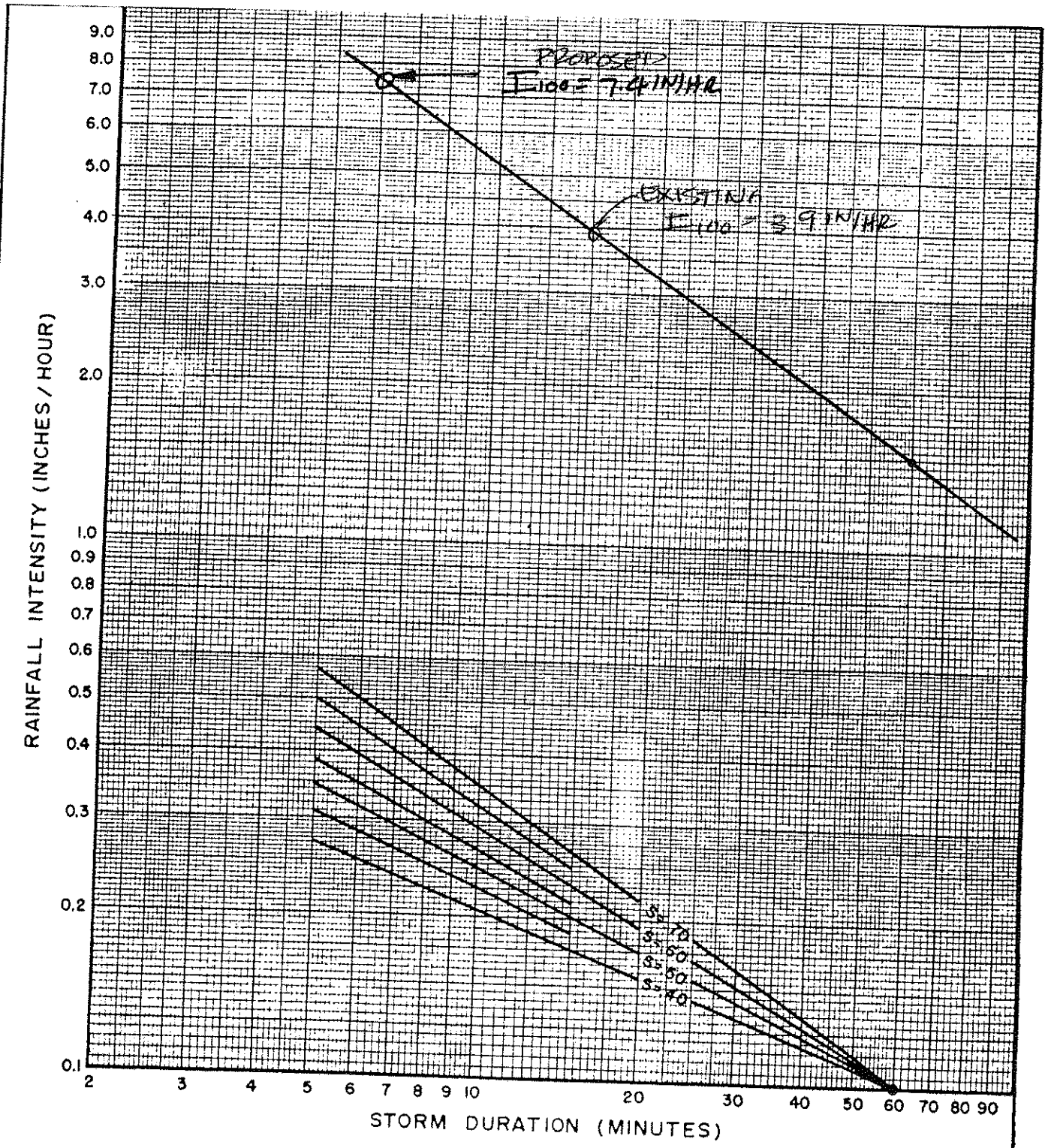
PROJECT LOCATION = ERWIN LAKE

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3



DESIGN STORM FREQUENCY = 100 YEARS

ONE HOUR POINT RAINFALL = 1.50 INCHES

LOG-LOG SLOPE = 0.70

PROJECT LOCATION = ERWIN LAKE

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3

Curve (1) 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
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, 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	71	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	25	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)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

10YR: $F_m = (0.57)(0.15) = 0.09$

100YR: $F_m = (0.27)(0.15) = 0.04$

$F_m = F_p \, a_p$: COMM DEV $a_p = 0.15$

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS SCS CURVE NUMBERS

Figure C-6

SIMPLIFIED UNIT HYDROGRAPH

ASSUME RETENTION OF ALL ON-SITE 100-YR STORM FLOWS

Q_{100} = 5.30cfs TC = 6 MIN

REQUIRED RETENTION VOLUME

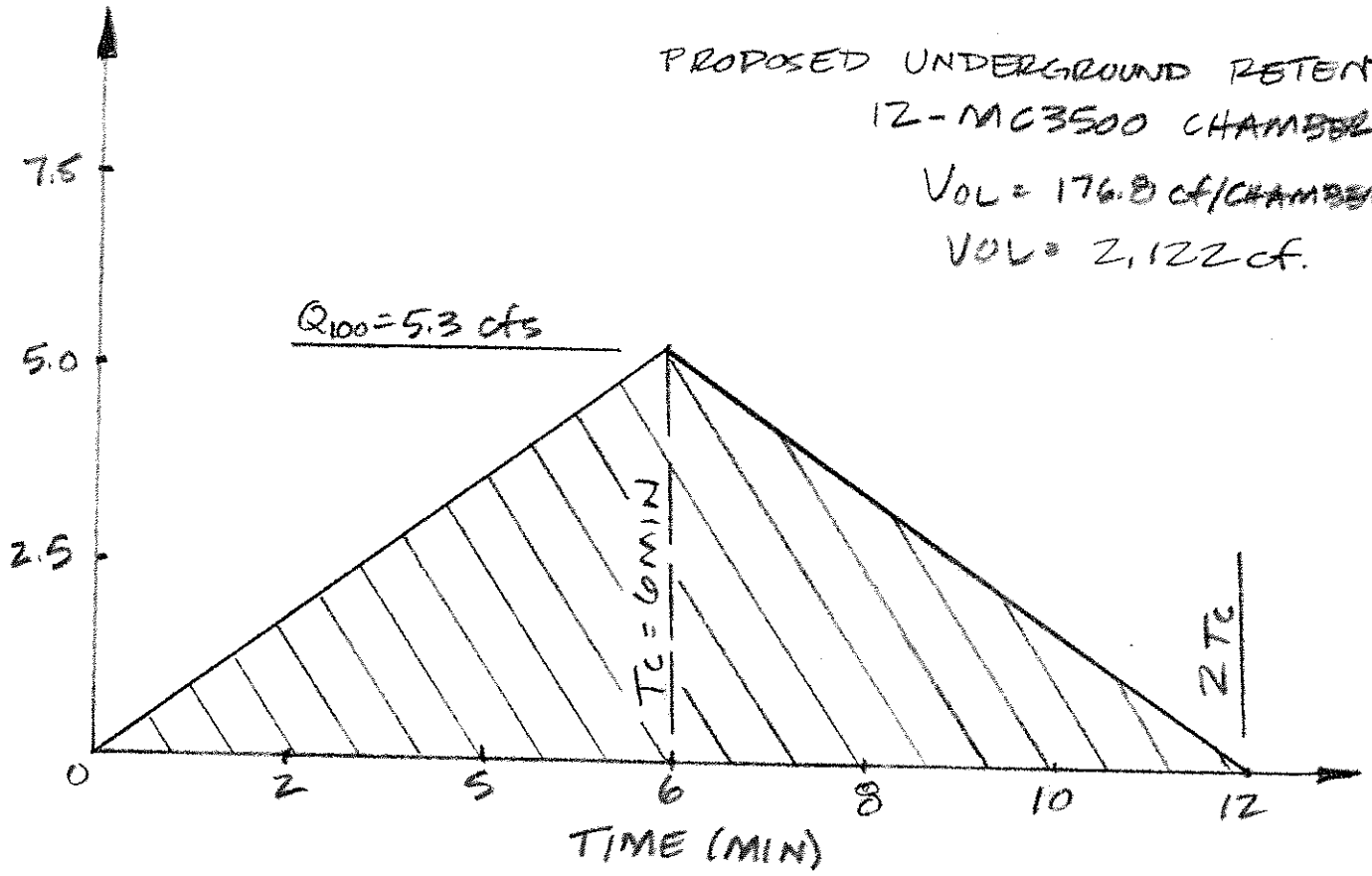
$V_{REQ'D}$ = 5.3cfs × 12 MIN × 1/2 × 60 SEC/MIN = 1.908cfs.

PROPOSED UNDERGROUND RETENTION

12-MC3500 CHAMBER

VOL = 176.8 cf/CHAMBER × 12

VOL = 2,122 cf.



EAGLE RIDGE MANOR HWY 395 & STATE LN EDWIN LAKE, CA