

J.N.:0810 C 643

LAMDA ENGINEERING AND DEVELOPMENT
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[lamdadev @ yahoo.com](mailto:lamdadev@yahoo.com)

PROJECT: On- Site Hydrology and Hydraulic study
LOCATION: Billy Joe Lane, Temecula
OWNER: Mr. Sean Moore

CLIENT: Sean Moore

DATE: February, 2011

SHIPPED:

REVISIONS:

DESIGNED BY:
CHECKED BY:

INTRODUCTION:

This office has been retained by Mr. Sean Moore to prepare a Preliminary Hydrology and Hydraulic Report to determine the off site tributary flows to the referenced property.

EXISTING CONDITION:

The site is traversed by two natural earthen channels coming from two drainage basins that join at the very south end of the property, at what can be considered the outlet point; these two drainage basins never merge except at the very last 50 feet of towards the southern end. One of these two basins come into the subject property from the North east and the other from the north west, these two basins as they traverse the property are not improved and remain in their natural condition both have eroded earthen walls, and their bottoms have been filled with silt, the silt deposits during the past storm seasons can be estimated to have raised approximately 24 to 36 inches, because of this when high rains occur, the flows generated upstream endanger the existing residence.

The two off site tributary basins consists of areas of approximately 400 acres each, located to the north of the property, most of the basin has a soil classification of D, according to the Riverside County Hydrology Map, and the land is considered valley terrain with hills and well determined swales.

In general the area is rural residential and is in natural undeveloped condition.

PROPOSED CONDITION:

This development consists of the construction of rip-rap side walls that will better define the existing earthen channel, these walls will follow the existing alignment of the channel, the proposed bottom will not be modified, and it will continue to be earthen lined. No alteration of existing flow patterns are proposed, per the development plans. No substantial negative impact by on-site flows unto adjacent properties is expected due to this development.

HYDROLOGY:

Using the County of Riverside Hydrology Manual, and implementing the Rational Method Hydrology this office has developed calculations to determine the existing run-off. All charts and tables used are attached for review hereon on Appendix A.

HYDRAULIC ANALISYS:

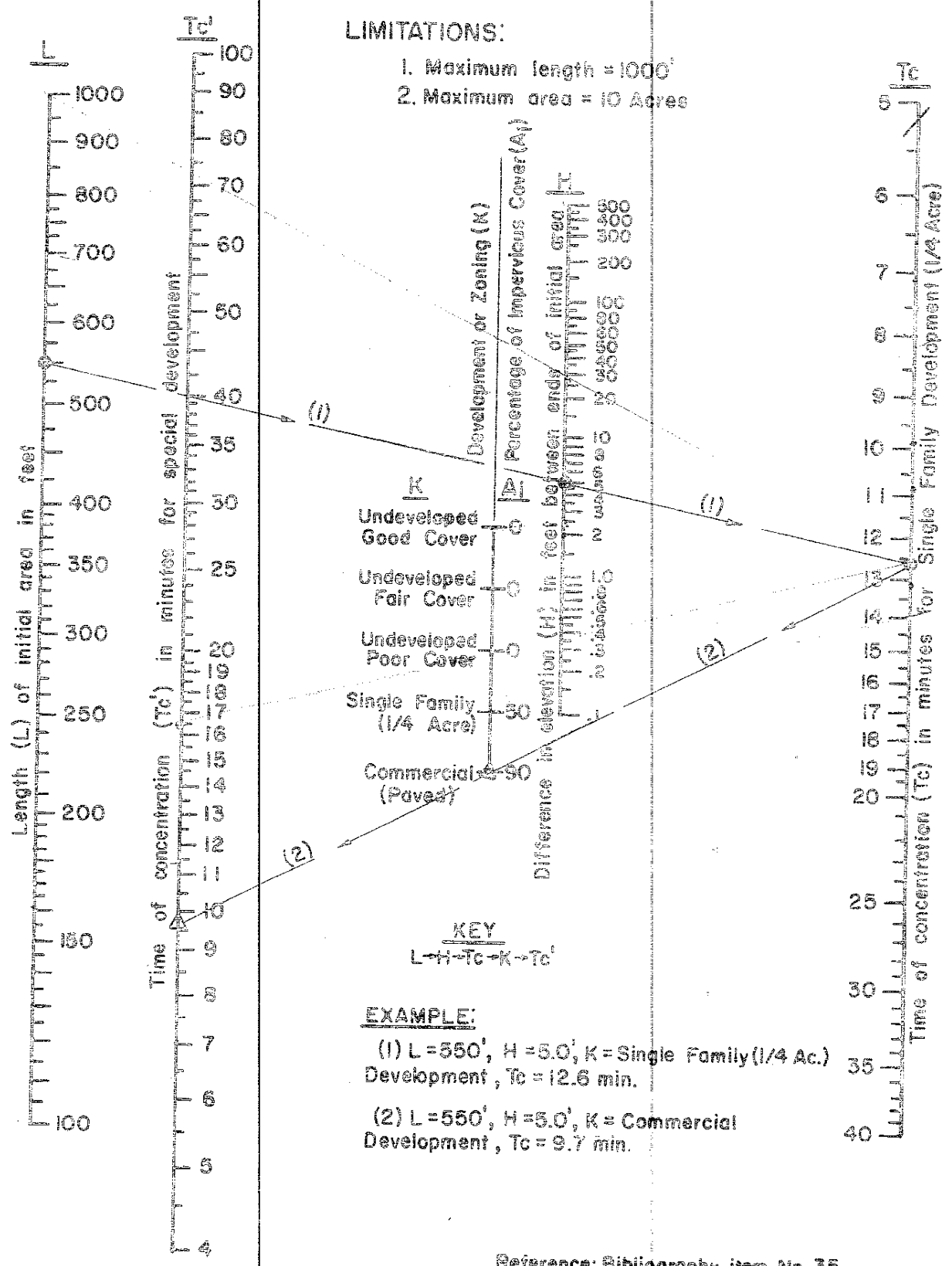
With the calculated 100 year frequency flows we have calculated the water surface elevations on the improved channels, computer calculations and charts used to verify storm flow velocities and depths of flow are shown attached for review on Appendix B.

Thank you for the opportunity to be of service; if you have any questions or comments regarding this matter please do not hesitate to contact this office at your earliest convenience.

Sincerely,

Hector A. Lara, P.E.
Principal

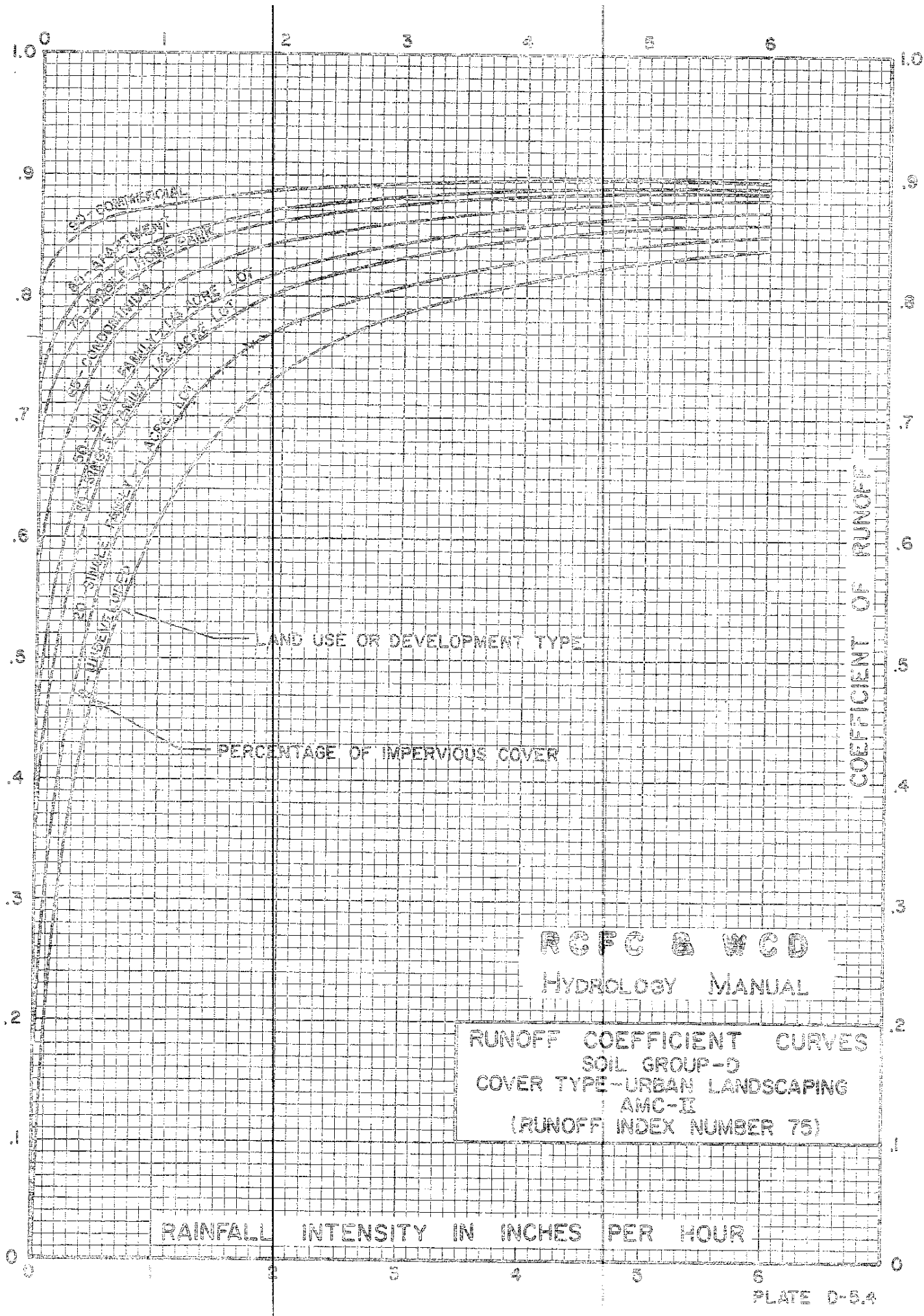
APPENDIX A
Rational Method
Hydrology



RCFC & WCD
 HYDROLOGY MANUAL

Reference: Bibliography item No. 35.

**TIME OF CONCENTRATION
 FOR INITIAL SUBAREA**



RCFC & WCD
 HYDROLOGY MANUAL

RUNOFF COEFFICIENT CURVES
 SOIL GROUP-D
 COVER TYPE-URBAN LANDSCAPING
 AMC-II
 (RUNOFF INDEX NUMBER 75)

RAINFALL INTENSITY IN INCHES PER HOUR

RAINFALL INTENSITY - INCHES PER HOUR

MIRA LOMA			MURRIETA - YEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.60	5	3.65	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.56	4.07	6	3.12	4.61	6	2.53	3.79	6	3.80	6.08	6	2.41	3.46
7	2.37	3.75	7	2.87	4.24	7	2.34	3.51	7	3.48	5.56	7	2.24	3.21
8	2.21	3.49	8	2.67	3.94	8	2.19	3.29	8	3.22	5.15	8	2.09	3.01
9	2.08	3.28	9	2.50	3.69	9	2.07	3.10	9	3.01	4.61	9	1.98	2.84
10	1.96	3.10	10	2.36	3.48	10	1.96	2.94	10	2.83	4.52	10	1.88	2.69
11	1.87	2.95	11	2.26	3.30	11	1.87	2.80	11	2.67	4.26	11	1.79	2.57
12	1.78	2.82	12	2.13	3.15	12	1.79	2.68	12	2.54	4.07	12	1.72	2.46
13	1.71	2.70	13	2.04	3.01	13	1.72	2.58	13	2.43	3.88	13	1.65	2.37
14	1.64	2.60	14	1.96	2.89	14	1.66	2.48	14	2.33	3.72	14	1.59	2.29
15	1.58	2.50	15	1.89	2.79	15	1.60	2.40	15	2.23	3.58	15	1.54	2.21
16	1.53	2.42	16	1.82	2.69	16	1.55	2.32	16	2.15	3.44	16	1.49	2.14
17	1.48	2.34	17	1.76	2.60	17	1.50	2.25	17	2.08	3.32	17	1.45	2.08
18	1.44	2.27	18	1.71	2.52	18	1.46	2.19	18	2.01	3.22	18	1.41	2.02
19	1.40	2.21	19	1.66	2.45	19	1.42	2.13	19	1.95	3.12	19	1.37	1.97
20	1.36	2.15	20	1.61	2.38	20	1.39	2.08	20	1.89	3.03	20	1.34	1.92
22	1.29	2.04	22	1.53	2.26	22	1.32	1.98	22	1.79	2.86	22	1.28	1.83
24	1.24	1.95	24	1.46	2.15	24	1.26	1.90	24	1.70	2.72	24	1.22	1.75
26	1.18	1.87	26	1.39	2.06	26	1.22	1.82	26	1.62	2.60	26	1.18	1.69
28	1.14	1.80	28	1.34	1.98	28	1.17	1.76	28	1.56	2.49	28	1.13	1.63
30	1.10	1.73	30	1.29	1.90	30	1.13	1.70	30	1.49	2.39	30	1.10	1.57
32	1.06	1.67	32	1.24	1.84	32	1.10	1.66	32	1.44	2.30	32	1.06	1.52
34	1.03	1.62	34	1.20	1.78	34	1.06	1.59	34	1.39	2.22	34	1.03	1.46
36	1.00	1.57	36	1.17	1.72	36	1.03	1.55	36	1.34	2.15	36	1.00	1.44
38	.97	1.53	38	1.13	1.67	38	1.01	1.51	38	1.30	2.09	38	.98	1.40
40	.94	1.49	40	1.10	1.62	40	.98	1.47	40	1.27	2.02	40	.95	1.37
45	.89	1.40	45	1.03	1.52	45	.92	1.39	45	1.16	1.99	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.86	1.31	50	1.11	1.90	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.84	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.80	60	.76	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.73	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.68	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.61	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.55	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.51	85	.65	.94

SLOPE = .530

SLOPE = .550

SLOPE = .500

SLOPE = .500

SLOPE = .490

LOCATION TEMPERLEY

ONE HOUR PRECIPITATION:

2-YR. _____ (PLATE D-4.3)

100-YR. _____ (PLATE D-4.4)

5-YR. _____ (PLATE D-4.5)

10-YR. _____ (PLATE D-4.5)

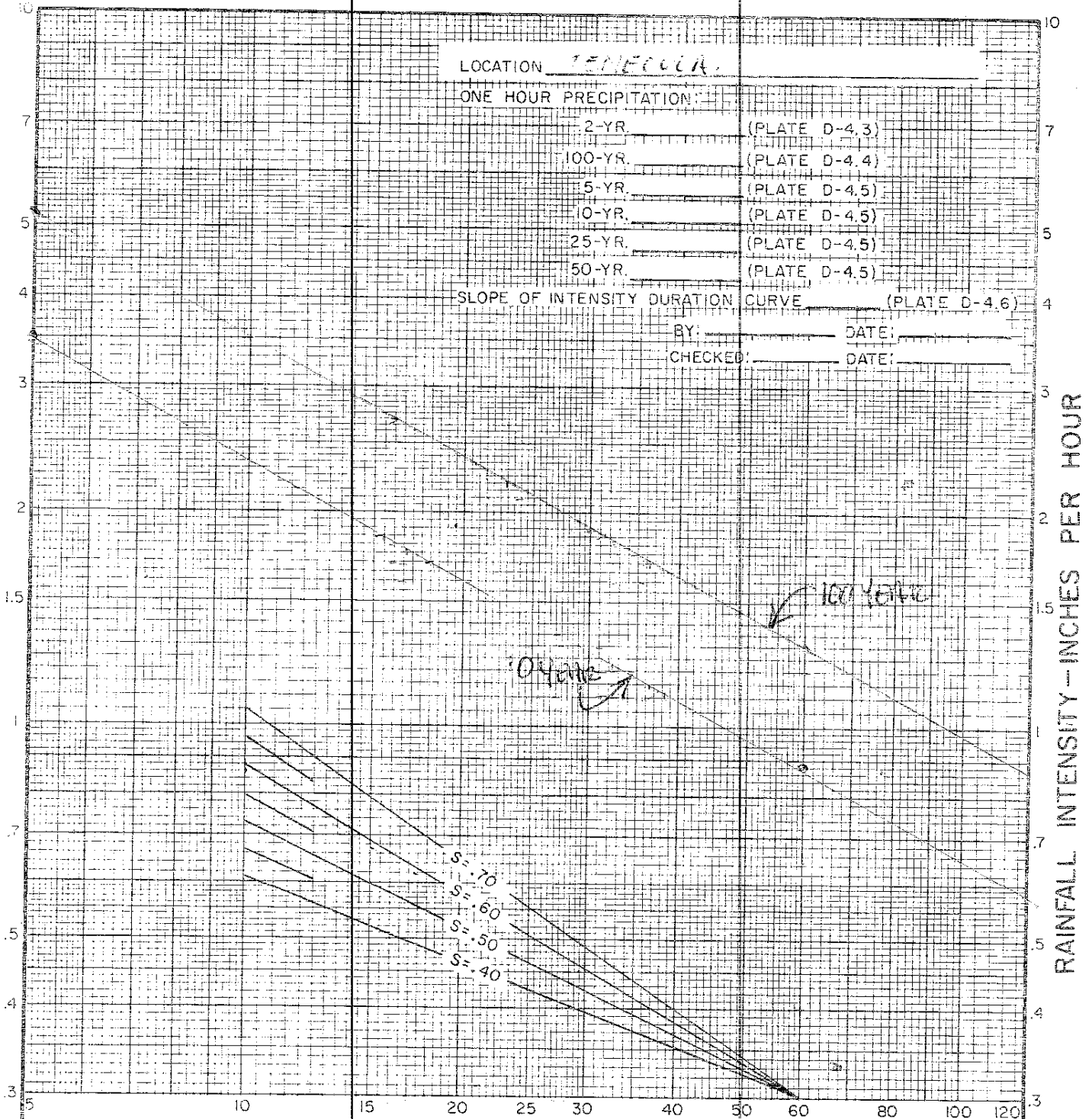
25-YR. _____ (PLATE D-4.5)

50-YR. _____ (PLATE D-4.5)

SLOPE OF INTENSITY DURATION CURVE _____ (PLATE D-4.6)

BY: _____ DATE: _____

CHECKED: _____ DATE: _____

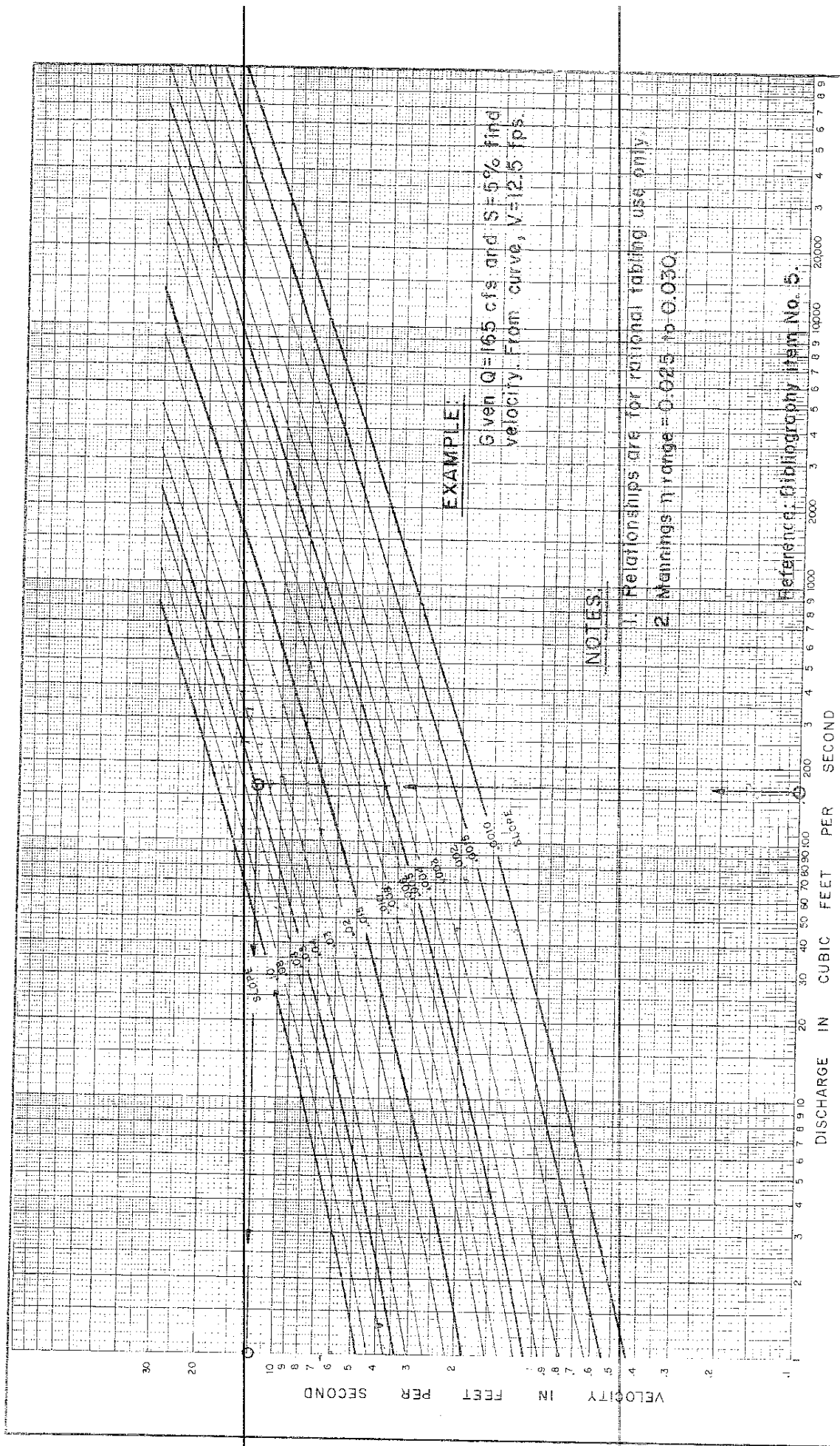


STORM DURATION - MINUTES

RAINFALL INTENSITY - INCHES PER HOUR

RCFC & WCD
HYDROLOGY MANUAL

INTENSITY-DURATION
CURVES
CALCULATION SHEET



EXAMPLE:

Given $Q=165$ cfs and $S=5\%$ find velocity. From curve, $V=12.5$ fps

NOTES:

1. Relationships are for rational tabling use only.
2. Mannings n range = 0.025 to 0.030.

Reference: Bibliography item No. 5.

VELOCITY-DISCHARGE-SLOPE
RELATIONSHIPS
NATURAL VALLEY CHANNELS

Rational Method Hydrology

County of Riverside

Job file: 0810c643

Job Address Sean Moore

Soils Type: D

Storm Frequency 10YR

Development coefficient developed

Node	Area	Design. In Acres	Length	slope	Velocity	Tc	I	C	CFS Q=CIA	CFS Acum Q
19	Elevation 1460	A acum. 0.00								
	B-1	16.72	924.00			16.0	1.80	0.765	23.02	
18	1450	16.72			3.2	8.0				23.02
	B-2	81.07	1539.00	0.01		24.0	1.45	0.735	86.40	
17	1440	97.79			8.5	1.3				109.42
	B-3	42.26	665.00	0.03		25.3	1.40	0.73	43.19	
16	1420	140.05			12.5	2.1				152.61
	B-4	55.77	1572.00	0.05		27.4	1.35	0.725	54.58	
15	1340	195.82			12	1.6				207.20
	B-5	53.07	1128.00	0.04		29.0	1.30	0.72	49.67	
14	1290	248.89			14	1.2				256.87
	B-6	37.47	1013.00	0.05		30.2	1.25	0.71	33.25	
13	1240	286.36			13.5	1.2				290.13
	B-7	28.64	951.00	0.04		31.4	1.25	0.71	25.42	
12	1205	315.00			7	0.6				315.54
	B-8	3.00	242.00	0.01		31.9	1.25	0.71	2.66	
11	1203	318.00								318.21
conflue								QA	420.90	
								IA/IB	292.75	
Tc=						39.4			Qp	713.65

Storm Frequency 100YR

Development coefficient developed

Node	Area	Design. In Acres	Length	slope	Velocity	Tc	I	C	CFS Q=CIA	CFS Acum Q
19	Elevation 1460	A acum. 0.00								
	B-1	16.72	924.00			16.0	2.70	0.8	36.12	
18	1450	16.72			3.5	7.3				36.12
	B-2	81.07	1539.00	0.01		23.3	2.20	0.78	139.12	
17	1440	97.79			10	1.1				175.23
	B-3	42.26	665.00	0.03		24.4	2.15	0.78	70.87	
16	1420	140.05			14	1.9				246.10
	B-4	55.77	1572.00	0.05		26.3	2.10	0.78	91.35	
15	1340	195.82			14	1.3				337.45
	B-5	53.07	1128.00	0.04		27.7	1.95	0.77	79.68	
14	1290	248.89			17	1.0				417.14
	B-6	37.47	1013.00	0.05		28.6	1.90	0.77	54.82	
13	1240	286.36			16	1.0				471.96
	B-7	28.64	951.00	0.04		29.6	1.90	0.77	41.90	
12	1205	315.00			8	0.5				513.86
	B-8	3.00	242.00	0.01		30.1	1.90	0.77	4.39	
11	1203	318.00								518.25
								QA	692.48	
								IA/IB	463.69	
Tc=						36.4			Qp	1156.18

Tc: time of concentration from Fig. 3. in minutes

I: Intensity for a storm from Plate D-47 with Tc

C: run off coefficient from resopective curve

APPENDIX B

Hydraulic Analysis

Channel A
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\academic\fmw\moore01.fm2
Worksheet	Channel A Q10 1.5to1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.022	
Channel Slope	0.015700	ft/ft
Left Side Slope	1.500000	H : V
Right Side Slope	1.500000	H : V
Bottom Width	15.00	ft
Discharge	420.90	cfs

Results		
Depth	2.00	ft
Flow Area	36.03	ft ²
Wetted Perimeter	22.22	ft
Top Width	21.00	ft
Critical Depth	2.65	ft
Critical Slope	0.005945	ft/ft
Velocity	11.68	ft/s
Velocity Head	2.12	ft
Specific Energy	4.12	ft
Froude Number	1.57	
Flow is supercritical.		

Channel B
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\academic\fmw\moore01.fm2
Worksheet	channel B Q10 1.5to1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.022	
Channel Slope	0.012700	ft/ft
Left Side Slope	1.500000	H : V
Right Side Slope	1.500000	H : V
Bottom Width	15.00	ft
Discharge	318.21	cfs

Results		
Depth	1.81	ft
Flow Area	32.06	ft ²
Wetted Perimeter	21.52	ft
Top Width	20.43	ft
Critical Depth	2.23	ft
Critical Slope	0.006188	ft/ft
Velocity	9.93	ft/s
Velocity Head	1.53	ft
Specific Energy	3.34	ft
Froude Number	1.40	
Flow is supercritical.		

Channel C
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\academic\fmw\moore01.fm2
Worksheet	CHANNEL OUTLET BY PL Q10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.022	
Channel Slope	0.010000	ft/ft
Left Side Slope	1.500000	H : V
Right Side Slope	1.500000	H : V
Bottom Width	22.00	ft
Discharge	713.65	cfs

Results		
Depth	2.51	ft
Flow Area	64.75	ft ²
Wetted Perimeter	31.06	ft
Top Width	29.54	ft
Critical Depth	2.98	ft
Critical Slope	0.005569	ft/ft
Velocity	11.02	ft/s
Velocity Head	1.89	ft
Specific Energy	4.40	ft
Froude Number	1.31	
Flow is supercritical.		

LOT 81 TRACT NO. 12129 GRADING PLAN HYDROLOGY MAP

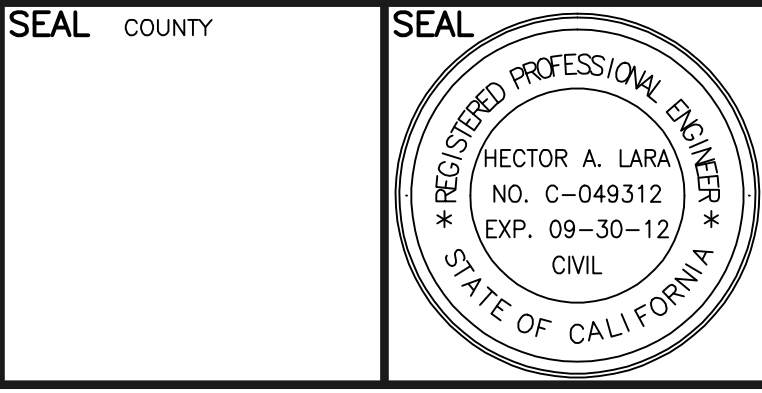


BGR 100288 WJD # APN 952-300-012

PLANS PREPARED BY:
LAMDA ENGINEERING & DEVELOPMENT
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E-mail: lamdadev@yahoo.com

NO.	DATE	BY	REVISIONS	APPR. DATE

RECOMMENDED FOR APPROVAL
SEAL COUNTY
DATE
CHECKED BY:
DATE



APPROVED BY: _____ DATE _____
FOR RIVERSIDE COUNTY CALIFORNIA
R.C.E. NO. _____ EXP. DATE _____
PREPARED BY:
Hector A. Lara, P.E.
R.C.E. NO. C 049312 EXP. DATE 9/30/2012

HYDROLOGY MAP

SCALE: AS SHOWN BENCH MARK: SEE ABOVE PROJECT DATA
DATE 01/25/2011

HYDROLOGY MAP

LOT 81 TRACT NO.12129
BILLY JOE LANE
TEMECULA, CA.
FOR: Moore WO: 0610 C 638

SHEET NO. **1**
OF 1 SHEETS
FILE NO.