

Grant Becklund

Civil Engineering
RCE 23737

**Preliminary Drainage Study
MA20269
Jurupa Self-Storage Project
68th Street
City of Jurupa Valley
February 2022**

Prepared for Jurupa Valley 18
31938 Temecula Parkway
Suite A369
Temecula, CA 92596
(951) 297-8120

Prepared by Grant Becklund
RCE 23737
Expires 12/31/2023



30811 Garbani Road
Winchester, CA 92596
(951) 288-0601

**Preliminary Drainage Study
Jurupa Self-Storage Facility
February 26, 2022**

INTRODUCTION:

The purpose of this report is to summarize the post-development drainage characteristics relative to the subject property. This project is a proposal to develop a self-storage facility on approximately 13 acres with an access road from 68th Street along the East side of the I-15 freeway in the City of Jurupa Valley.

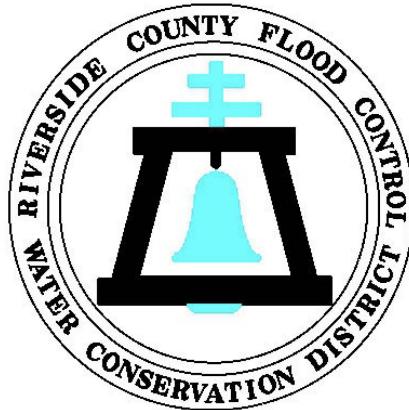
SIE DESCRIPTION:

The site consists of approximately 13 acres that is currently vacant, covered with native weeds. This property has historically been used for farming and currently does not have structures. The north side of the site is adjacent to the Riverbend development of single family homes which prevents flows from entering this site with the development's on-site storm drain system shielding this site from drainage. The entire project site drains southerly to the Santa Ana River which is located off-site of this project.

The Self-Storage Facility will be developed with 9.1 acres of buildings, paved access roads and landscaping along the frontage of the I-15 freeway. All on-site storm flows will be collected in roof drains and catch basins connected to an on-site storm drain system that delivers these flows to a 3.9 acre basin which will store all the flows and let them infiltrate into the sandy, native material in the bottom of the basin. All storm flows from this project will be captured on-site with no flows leaving the site and entering the Santa Ana River.

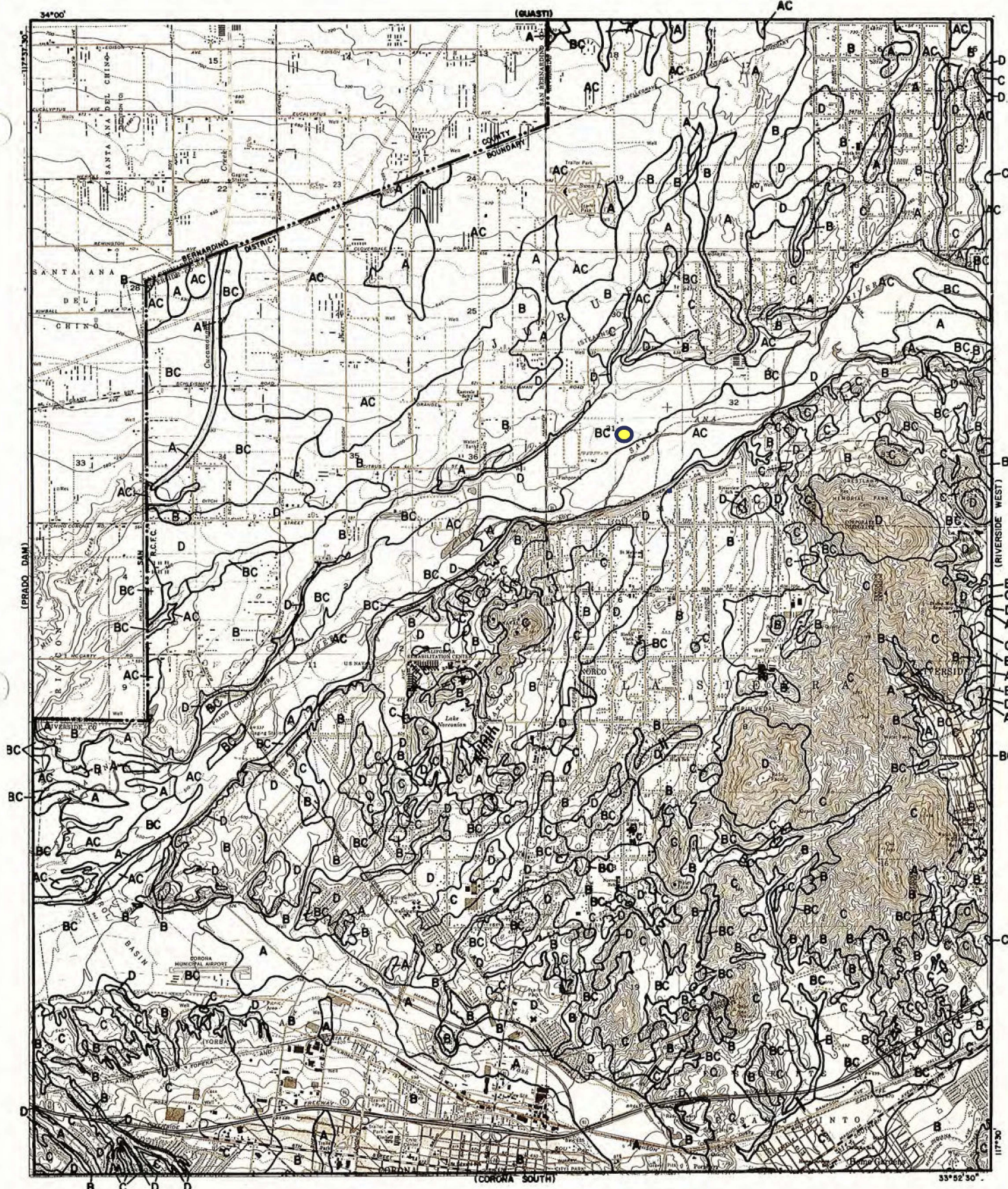
Riverside County Flood Control
and Water Conservation District

HYDROLOGY MANUAL



April 1978

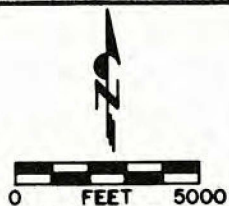
JOHN W. BRYANT
CHIEF ENGINEER



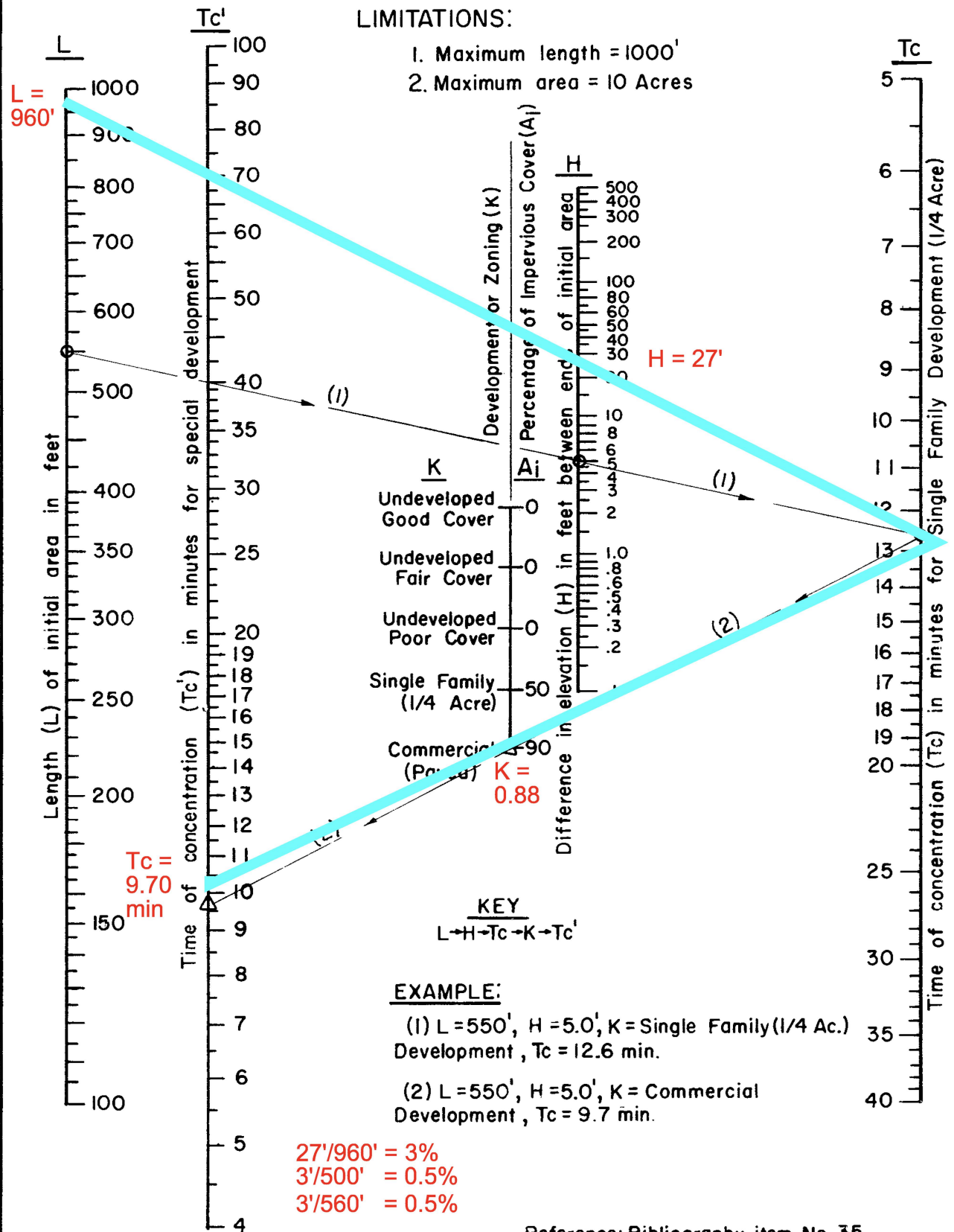
LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC&WCD
HYDROLOGY MANUAL



**HYDROLOGIC SOILS GROUP MAP
FOR
CORONA-NORTH**



RCFC & WCD
HYDROLOGY MANUAL

**TIME OF CONCENTRATION
FOR INITIAL SUBAREA**

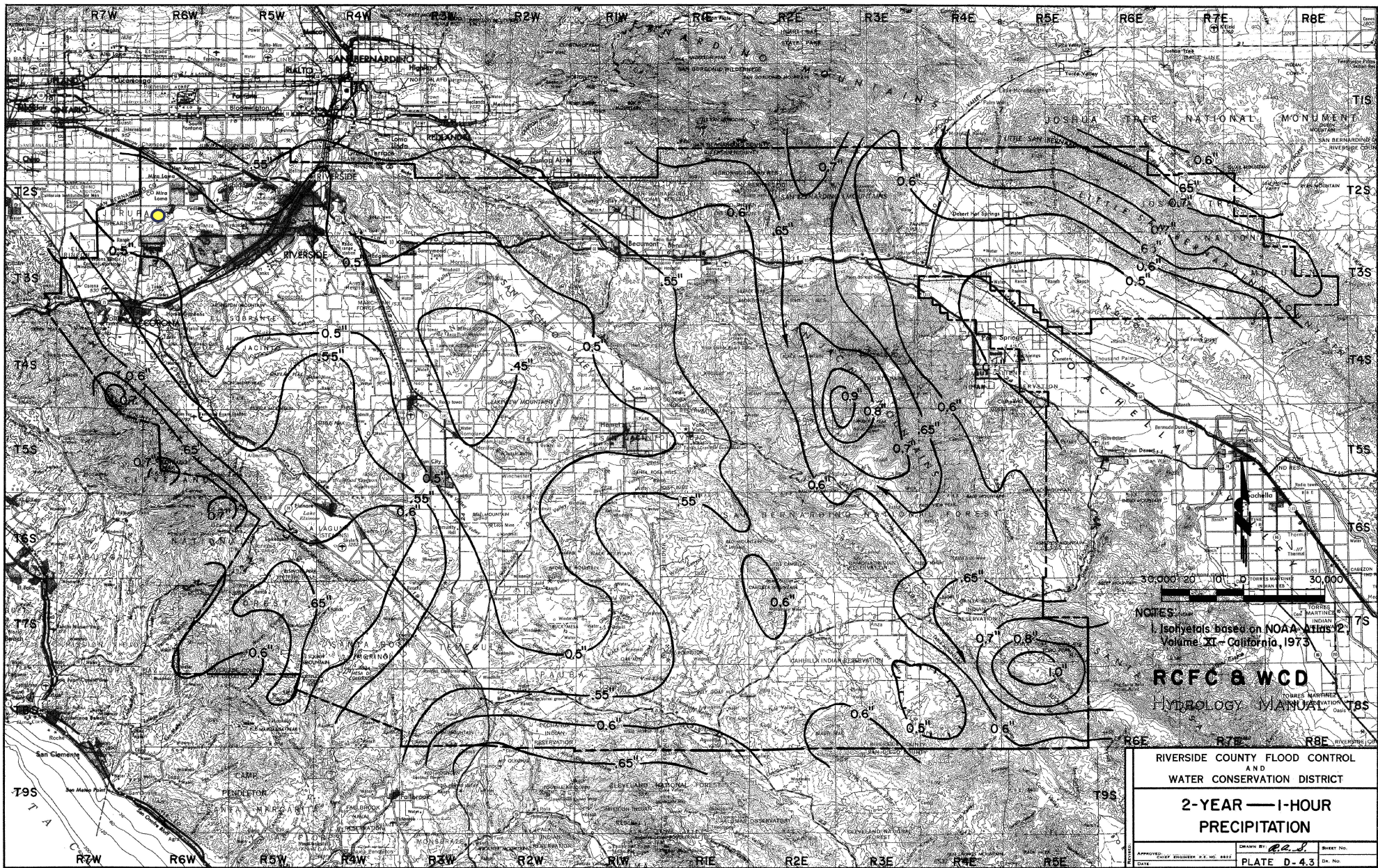
Reference: Bibliography item No. 35.

RAINFALL INTENSITY-INCHES PER HOUR

RCFC & WCD
HYDROLOGY MANUAL

STANDARD
INTENSITY - DURATION
CURVES DATA

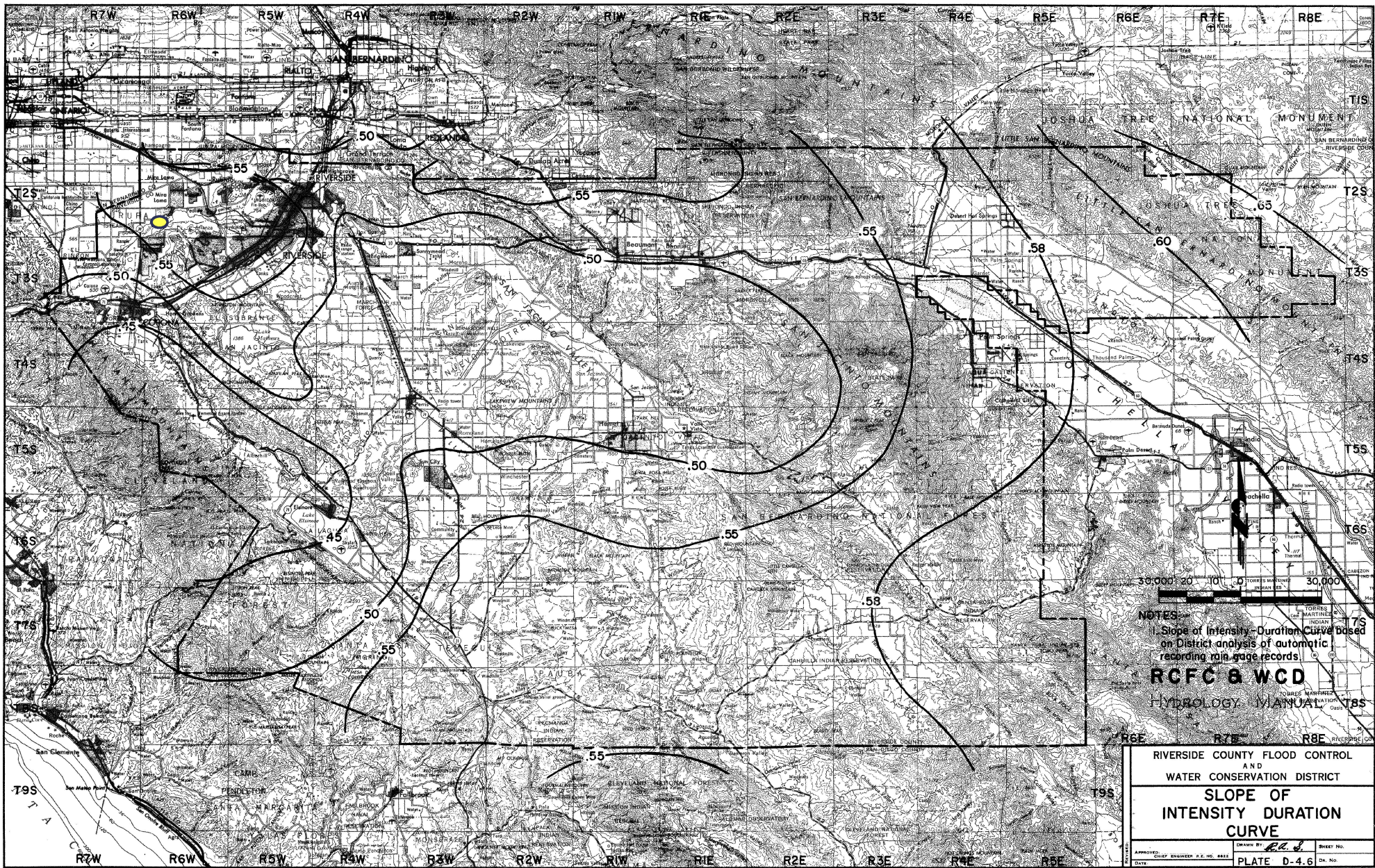
MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.48	5	3.45	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.58	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	4.81	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	2.24	3.30	11	1.87	2.80	11	2.67	4.28	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	1.64	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	1.48
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	1.18	1.89	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.88	1.31	50	1.11	1.78	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.68	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.60	60	.78	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.53	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.46	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.41	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.35	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.31	85	.66	.94
SLOPE = .530			SLOPE = .550			SLOPE = .500			SLOPE = .580			SLOPE = .490		



NORES:
Isohyets 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		
APPROVED: CHIEF ENGINEER DATE: _____	DRAWN BY: <i>R.L.</i> DATE: _____	SHEET NO.: PLATE D-43



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

RCFC & WCD
HYDROLOGY MANUAL

**RUNOFF INDEX NUMBERS
FOR
PERVIOUS AREA**

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
<u>AGRICULTURAL COVERS</u> (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.

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HYDROLOGY MANUAL

**RUNOFF INDEX NUMBERS
FOR
PERVIOUS AREA**

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.

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IMPERVIOUS COVER
FOR
DEVELOPED AREAS

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RUNOFF COEFFICIENTS FOR RI INDEX NO. = 52

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.26	.40	.49	.56	.60	.64	.67	.69	.72	.75
5.	.04	.29	.43	.51	.57	.62	.65	.68	.70	.73	.75
10.	.09	.32	.45	.53	.59	.63	.66	.69	.71	.74	.76
15.	.13	.36	.48	.56	.61	.65	.68	.70	.72	.75	.77
20.	.18	.39	.50	.58	.63	.66	.69	.71	.73	.76	.78
25.	.22	.42	.53	.60	.64	.68	.70	.72	.74	.77	.79
30.	.27	.45	.55	.62	.66	.69	.72	.74	.75	.78	.79
35.	.31	.48	.58	.64	.68	.71	.73	.75	.76	.78	.80
40.	.36	.52	.60	.66	.69	.72	.74	.76	.77	.79	.81
45.	.40	.55	.63	.68	.71	.74	.76	.77	.78	.80	.82
50.	.45	.58	.65	.70	.73	.75	.77	.78	.79	.81	.82
55.	.49	.61	.68	.72	.75	.77	.78	.79	.80	.82	.83
60.	.54	.64	.70	.74	.76	.78	.80	.81	.82	.83	.84
65.	.58	.68	.73	.76	.78	.80	.81	.82	.83	.84	.85
70.	.63	.71	.75	.78	.80	.81	.82	.83	.84	.85	.85
75.	.67	.74	.78	.80	.81	.83	.83	.84	.85	.86	.86
80.	.72	.77	.80	.82	.83	.84	.85	.85	.86	.86	.87
85.	.76	.80	.83	.84	.85	.86	.86	.86	.87	.87	.88
90.	.81	.84	.85	.86	.87	.87	.87	.88	.88	.88	.88
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 54

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.28	.42	.51	.57	.62	.65	.68	.70	.73	.76
5.	.04	.31	.45	.53	.59	.63	.67	.69	.71	.74	.76
10.	.09	.34	.47	.55	.61	.65	.68	.70	.72	.75	.77
15.	.13	.37	.49	.57	.62	.66	.69	.71	.73	.76	.78
20.	.18	.40	.52	.59	.64	.68	.70	.72	.74	.77	.79
25.	.22	.43	.54	.61	.66	.69	.71	.73	.75	.78	.79
30.	.27	.46	.56	.63	.67	.70	.73	.75	.76	.78	.80
35.	.31	.49	.59	.65	.69	.72	.74	.76	.77	.79	.81
40.	.36	.53	.61	.67	.70	.73	.75	.77	.78	.80	.81
45.	.40	.56	.64	.69	.72	.75	.76	.78	.79	.81	.82
50.	.45	.59	.66	.71	.74	.76	.78	.79	.80	.82	.83
55.	.49	.62	.68	.73	.75	.77	.79	.80	.81	.83	.84
60.	.54	.65	.71	.74	.77	.79	.80	.81	.82	.83	.84
65.	.58	.68	.73	.76	.79	.80	.81	.82	.83	.84	.85
70.	.63	.71	.76	.78	.80	.82	.83	.83	.84	.85	.86
75.	.67	.74	.78	.80	.82	.83	.84	.84	.85	.86	.86
80.	.72	.78	.80	.82	.83	.84	.85	.86	.86	.87	.87
85.	.76	.81	.83	.84	.85	.86	.86	.86	.87	.88	.88
90.	.81	.84	.85	.86	.87	.87	.88	.88	.88	.88	.89
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 56

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.29	.44	.53	.59	.63	.67	.69	.71	.74	.77
5.	.04	.32	.46	.55	.61	.65	.68	.70	.72	.75	.77
10.	.09	.35	.49	.57	.62	.66	.69	.71	.73	.76	.78
15.	.13	.38	.51	.59	.64	.67	.70	.72	.74	.77	.79
20.	.18	.41	.53	.60	.65	.69	.71	.73	.75	.78	.79
25.	.22	.44	.55	.62	.67	.70	.73	.74	.76	.78	.80
30.	.27	.47	.58	.64	.68	.71	.74	.75	.77	.79	.81
35.	.31	.50	.60	.66	.70	.73	.75	.77	.78	.80	.81
40.	.36	.53	.62	.68	.71	.74	.76	.78	.79	.81	.82
45.	.40	.56	.65	.70	.73	.75	.77	.79	.80	.81	.83
50.	.45	.60	.67	.71	.75	.77	.78	.80	.81	.82	.83
55.	.49	.63	.69	.73	.76	.78	.80	.81	.82	.83	.84
60.	.54	.66	.72	.75	.78	.79	.81	.82	.83	.84	.85
65.	.58	.69	.74	.77	.79	.81	.82	.83	.83	.85	.85
70.	.63	.72	.76	.79	.81	.82	.83	.84	.84	.85	.86
75.	.67	.75	.78	.81	.82	.83	.84	.85	.85	.86	.87
80.	.72	.78	.81	.83	.84	.85	.85	.86	.86	.87	.87
85.	.76	.81	.83	.84	.85	.86	.87	.87	.87	.88	.88
90.	.81	.84	.85	.86	.87	.87	.88	.88	.88	.88	.89
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 58

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.31	.46	.55	.61	.65	.68	.71	.73	.75	.78
5.	.04	.34	.48	.57	.62	.66	.69	.72	.73	.76	.78
10.	.09	.37	.50	.58	.64	.67	.70	.72	.74	.77	.79
15.	.13	.40	.52	.60	.65	.69	.71	.73	.75	.78	.79
20.	.18	.43	.55	.62	.67	.70	.72	.74	.76	.78	.80
25.	.22	.46	.57	.64	.68	.71	.74	.75	.77	.79	.81
30.	.27	.48	.59	.65	.69	.72	.75	.76	.78	.80	.81
35.	.31	.51	.61	.67	.71	.74	.76	.77	.79	.81	.82
40.	.36	.54	.63	.69	.72	.75	.77	.78	.79	.81	.83
45.	.40	.57	.66	.71	.74	.76	.78	.79	.80	.82	.83
50.	.45	.60	.68	.72	.75	.77	.79	.80	.81	.83	.84
55.	.49	.63	.70	.74	.77	.79	.80	.81	.82	.83	.84
60.	.54	.66	.72	.76	.78	.80	.81	.82	.83	.84	.85
65.	.58	.69	.75	.78	.80	.81	.82	.83	.84	.85	.86
70.	.63	.72	.77	.79	.81	.82	.83	.84	.85	.86	.86
75.	.67	.75	.79	.81	.83	.84	.85	.85	.86	.86	.87
80.	.72	.78	.81	.83	.84	.85	.86	.86	.86	.87	.88
85.	.76	.81	.83	.85	.86	.86	.87	.87	.87	.88	.88
90.	.81	.84	.86	.86	.87	.87	.88	.88	.88	.89	.89
95.	.86	.87	.88	.88	.89	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENT CURVE DATA

RCFC & WCD HYDROLOGY MANUAL

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 68

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.40	.55	.63	.69	.72	.74	.76	.78	.80	.81
5.	.04	.42	.57	.65	.70	.73	.75	.77	.78	.80	.82
10.	.09	.45	.59	.66	.71	.74	.76	.78	.79	.81	.82
15.	.13	.47	.61	.67	.72	.75	.77	.78	.80	.81	.83
20.	.18	.50	.62	.69	.73	.76	.78	.79	.80	.82	.83
25.	.22	.52	.64	.70	.74	.76	.78	.80	.81	.82	.84
30.	.27	.55	.66	.71	.75	.77	.79	.80	.81	.83	.84
35.	.31	.57	.67	.73	.76	.78	.80	.81	.82	.83	.84
40.	.36	.60	.69	.74	.77	.79	.81	.82	.83	.84	.85
45.	.40	.62	.71	.75	.78	.80	.81	.82	.83	.84	.85
50.	.45	.65	.73	.77	.79	.81	.82	.83	.84	.85	.86
55.	.49	.67	.74	.78	.80	.82	.83	.84	.85	.85	.86
60.	.54	.70	.76	.79	.81	.83	.84	.85	.85	.86	.87
65.	.58	.72	.78	.81	.82	.84	.85	.85	.86	.86	.87
70.	.63	.75	.80	.82	.84	.85	.85	.86	.86	.87	.87
75.	.67	.77	.81	.83	.85	.85	.86	.87	.87	.88	.88
80.	.72	.80	.83	.85	.86	.86	.87	.87	.88	.88	.88
85.	.76	.82	.85	.86	.87	.87	.88	.88	.88	.88	.89
90.	.81	.85	.87	.87	.88	.88	.88	.89	.89	.89	.89
95.	.86	.87	.88	.89	.89	.89	.89	.89	.89	.89	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 70

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.42	.57	.65	.70	.73	.76	.77	.79	.81	.82
5.	.04	.44	.59	.66	.71	.74	.76	.78	.79	.81	.83
10.	.09	.47	.61	.68	.72	.75	.77	.79	.80	.82	.83
15.	.13	.49	.62	.69	.73	.76	.78	.79	.80	.82	.83
20.	.18	.52	.64	.70	.74	.77	.78	.80	.81	.83	.84
25.	.22	.54	.65	.71	.75	.77	.79	.81	.82	.83	.84
30.	.27	.56	.67	.73	.76	.78	.80	.81	.82	.84	.85
35.	.31	.59	.69	.74	.77	.79	.81	.82	.83	.84	.85
40.	.36	.61	.70	.75	.78	.80	.81	.82	.83	.84	.85
45.	.40	.64	.72	.76	.79	.81	.82	.83	.84	.85	.86
50.	.45	.66	.74	.78	.80	.82	.83	.84	.84	.85	.86
55.	.49	.68	.75	.79	.81	.82	.84	.84	.85	.86	.86
60.	.54	.71	.77	.80	.82	.83	.84	.85	.86	.86	.87
65.	.58	.73	.79	.81	.83	.84	.85	.86	.86	.87	.87
70.	.63	.76	.80	.83	.84	.85	.86	.86	.87	.87	.88
75.	.67	.78	.82	.84	.85	.86	.86	.87	.87	.88	.88
80.	.72	.80	.83	.85	.86	.87	.87	.87	.88	.88	.88
85.	.76	.83	.85	.86	.87	.87	.88	.88	.88	.89	.89
90.	.81	.85	.87	.88	.88	.88	.89	.89	.89	.89	.89
95.	.86	.88	.88	.89	.89	.89	.89	.89	.89	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 72

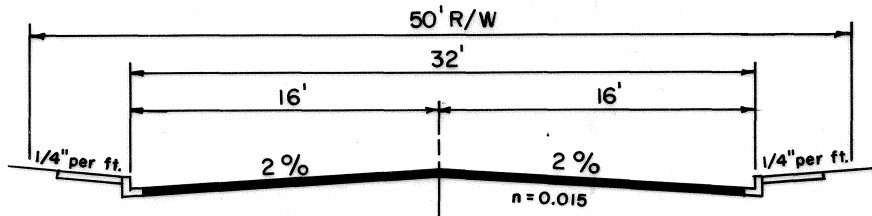
IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.44	.59	.67	.71	.75	.77	.78	.80	.82	.83
5.	.04	.46	.61	.68	.72	.75	.77	.79	.80	.82	.83
10.	.09	.49	.62	.69	.73	.76	.78	.80	.81	.82	.84
15.	.13	.51	.64	.70	.74	.77	.79	.80	.81	.83	.84
20.	.18	.53	.65	.72	.75	.78	.79	.81	.82	.83	.84
25.	.22	.56	.67	.73	.76	.78	.80	.81	.82	.84	.85
30.	.27	.58	.68	.74	.77	.79	.81	.82	.83	.84	.85
35.	.31	.60	.70	.75	.78	.80	.81	.82	.83	.85	.85
40.	.36	.63	.72	.76	.79	.81	.82	.83	.84	.85	.86
45.	.40	.65	.73	.77	.80	.81	.83	.84	.84	.85	.86
50.	.45	.67	.75	.78	.81	.82	.83	.84	.85	.86	.86
55.	.49	.69	.76	.80	.82	.83	.84	.85	.85	.86	.87
60.	.54	.72	.78	.81	.83	.84	.85	.85	.86	.87	.87
65.	.58	.74	.79	.82	.84	.85	.85	.86	.86	.87	.87
70.	.63	.76	.81	.83	.84	.85	.86	.87	.87	.88	.88
75.	.67	.79	.82	.84	.85	.86	.87	.87	.87	.88	.88
80.	.72	.81	.84	.85	.86	.87	.87	.88	.88	.88	.89
85.	.76	.83	.85	.87	.87	.88	.88	.88	.88	.89	.89
90.	.81	.85	.87	.88	.88	.88	.89	.89	.89	.89	.89
95.	.86	.88	.88	.89	.89	.89	.89	.89	.89	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 74

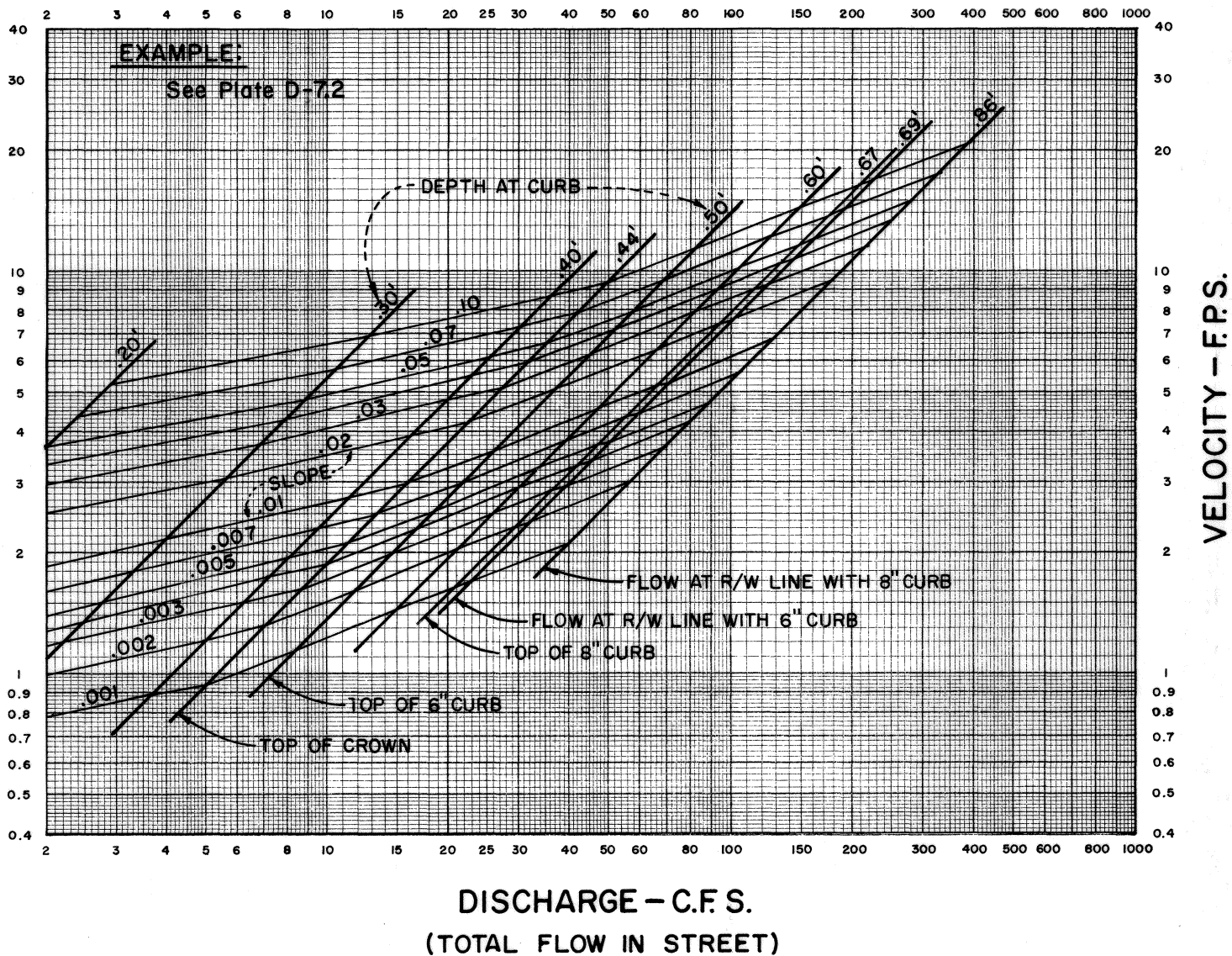
IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.46	.61	.69	.73	.76	.78	.79	.81	.82	.83
5.	.04	.49	.63	.70	.74	.77	.78	.80	.81	.83	.84
10.	.09	.51	.64	.71	.75	.77	.79	.80	.82	.83	.84
15.	.13	.53	.66	.72	.75	.78	.80	.81	.82	.83	.84
20.	.18	.55	.67	.73	.76	.79	.80	.82	.82	.84	.85
25.	.22	.57	.68	.74	.77	.79	.81	.82	.83	.84	.85
30.	.27	.60	.70	.75	.78	.80	.81	.83	.83	.85	.85
35.	.31	.62	.71	.76	.79	.81	.82	.83	.84	.85	.86
40.	.36	.64	.73	.77	.80	.81	.83	.84	.84	.85	.86
45.	.40	.66	.74	.78	.81	.82	.83	.84	.85	.86	.86
50.	.45	.68	.76	.79	.81	.83	.84	.85	.85	.86	.87
55.	.49	.70	.77	.80	.82	.84	.85	.85	.86	.87	.87
60.	.54	.73	.79	.81	.83	.84	.85	.86	.86	.87	.87
65.	.58	.75	.80	.83	.84	.85	.86	.86	.87	.87	.88
70.	.63	.77	.81	.84	.85	.86	.86	.87	.87	.88	.88
75.	.67	.79	.83	.85	.86	.86	.87	.87	.88	.88	.88
80.	.72	.81	.84	.86	.87	.87	.88	.88	.88	.88	.89
85.	.76	.83	.86	.87	.87	.88	.88	.88	.88	.89	.89
90.	.81	.86	.87	.88	.88	.89	.89	.89	.89	.89	.89
95.	.86	.88	.89	.89	.89	.89	.89	.89	.89	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENT

CURVE DATA



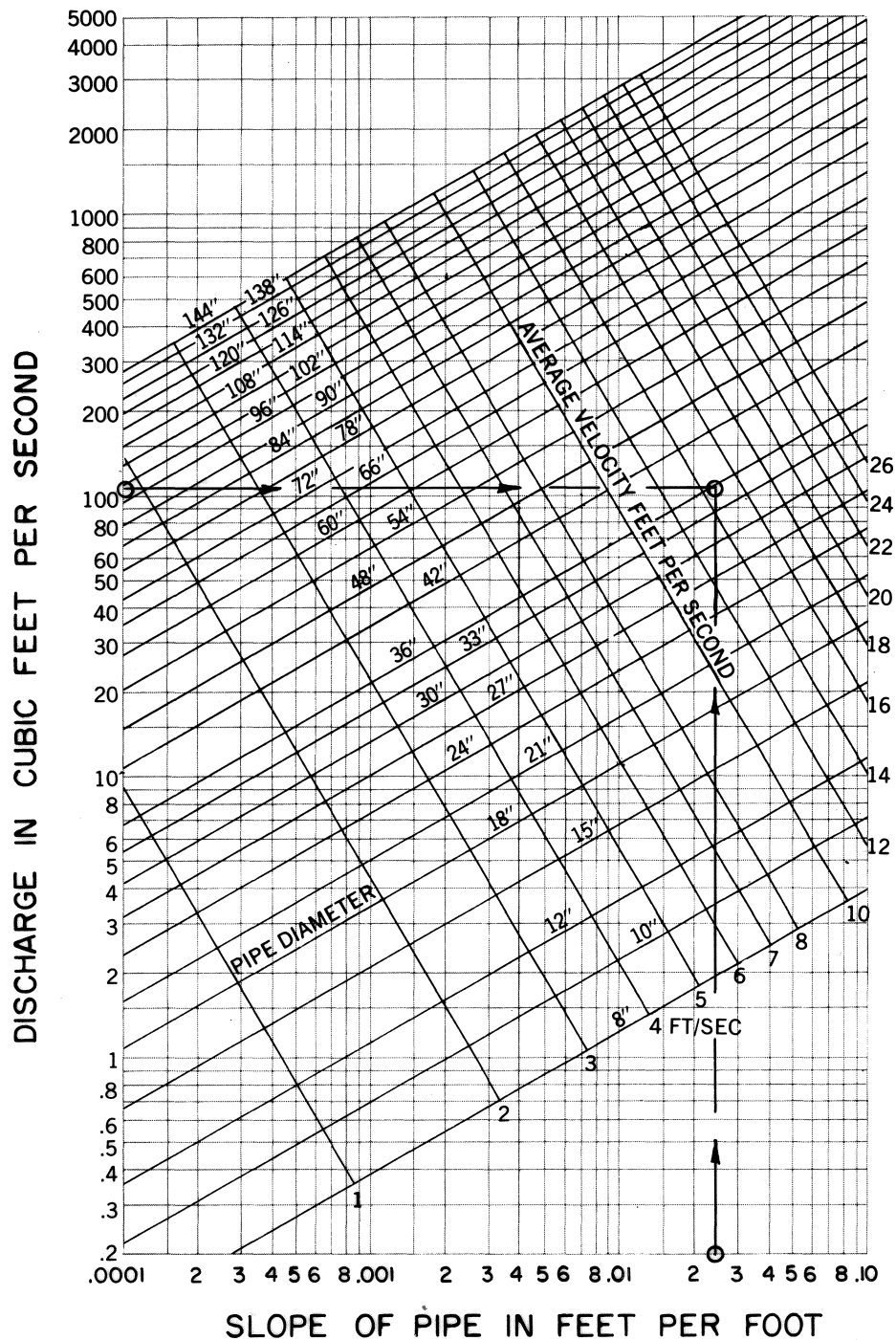
TYPICAL SECTION



RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
VELOCITY DISCHARGE CURVES		
COUNTY STANDARD No. 106		
32' ROADWAY 6" & 8" CURBS		
APPROVED: DATE:	DRAWN BY: <i>R.A.S.</i> CHECKED BY: <i>R.A.S.</i> DATE DRAWN: <i>JAN. 77</i>	SHEET NO. DR. NO.

BASED ON MANNING'S EQUATION $n=0.013$



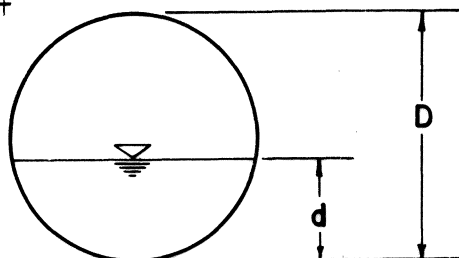
EXAMPLE:

Given $Q = 105$ cfs and $S = 2.5\%$ find required pipe size and velocity. From curves required Size = 36" ϕ and Velocity = 14.8 fps

Reference: Bibliography item No.10.

RCFC & WCD
HYDROLOGY MANUAL

VELOCITY DISCHARGE CURVE
CIRCULAR CONCRETE PIPES
FLOWING FULL



FLOW AT
FULL PIPE

A_D - FLOW AREA
 V_D - VELOCITY
 Q_D - DISCHARGE

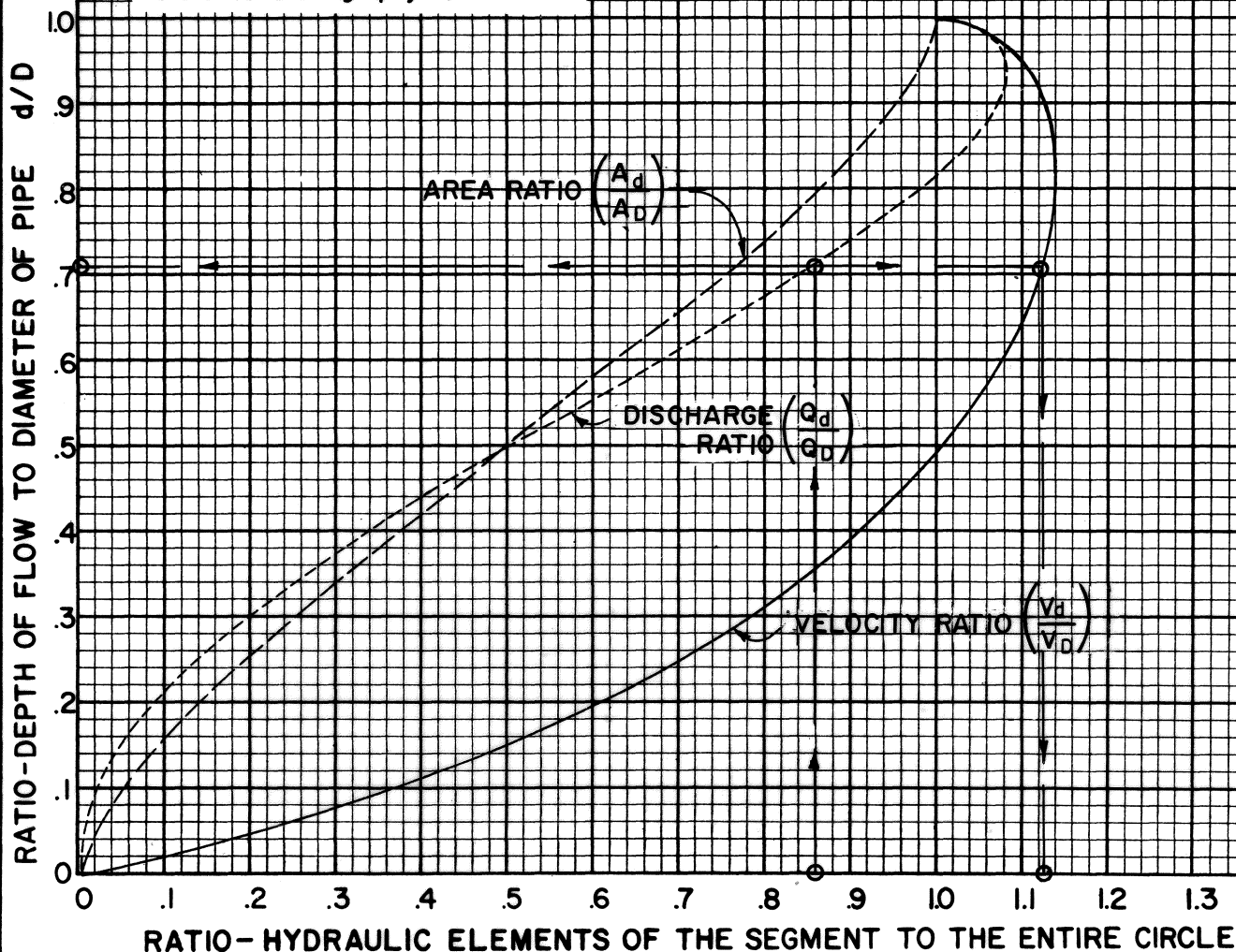
FLOW AT
DEPTH d

A_d - FLOW AREA
 V_d - VELOCITY
 Q_d - DISCHARGE

EXAMPLE:

Given $Q=90$ cfs, $S=2.5\%$ and $D=36''\phi$ (3' ϕ), find depth of flow and velocity. From example on Plate D-8.1, $Q_D=105$ cfs and $V_D=14.8$ fps. Then $Q_d/Q_D = 90 \text{ cfs} / 105 \text{ cfs} = 0.86$. From curve, $d/D=0.71$, then $d=0.71 \times 3' = 2.13'$. Also from curve, $V_d/V_D = 1.125$, then $V_d = 1.125 \times 14.8 \text{ fps} = 16.7 \text{ fps}$. A_d may be found in a similar manner.

Reference: Bibliography item No. 5.



RCFC & WCD
HYDROLOGY MANUAL

HYDRAULIC ELEMENTS
CIRCULAR PIPE

RATIONAL METHOD CALCULATION FORM

Sheet No. of Sheets

PROJECT MA20269 - Jurupa Self-Storage Project

Calculated by GB 2/26/2020
Checked by GB 2/26/2022

FREQUENCY 100-year and 10-year

[illegible]

