HYDROLOGY STUDY

Artis Senior Living
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San Marcos, CA 92078

Assessor's Parcel Number: 223-651-01-00

Prepared For:

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May 16, 2018

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May 23, 2018

Contents

1. INTRODUCTION

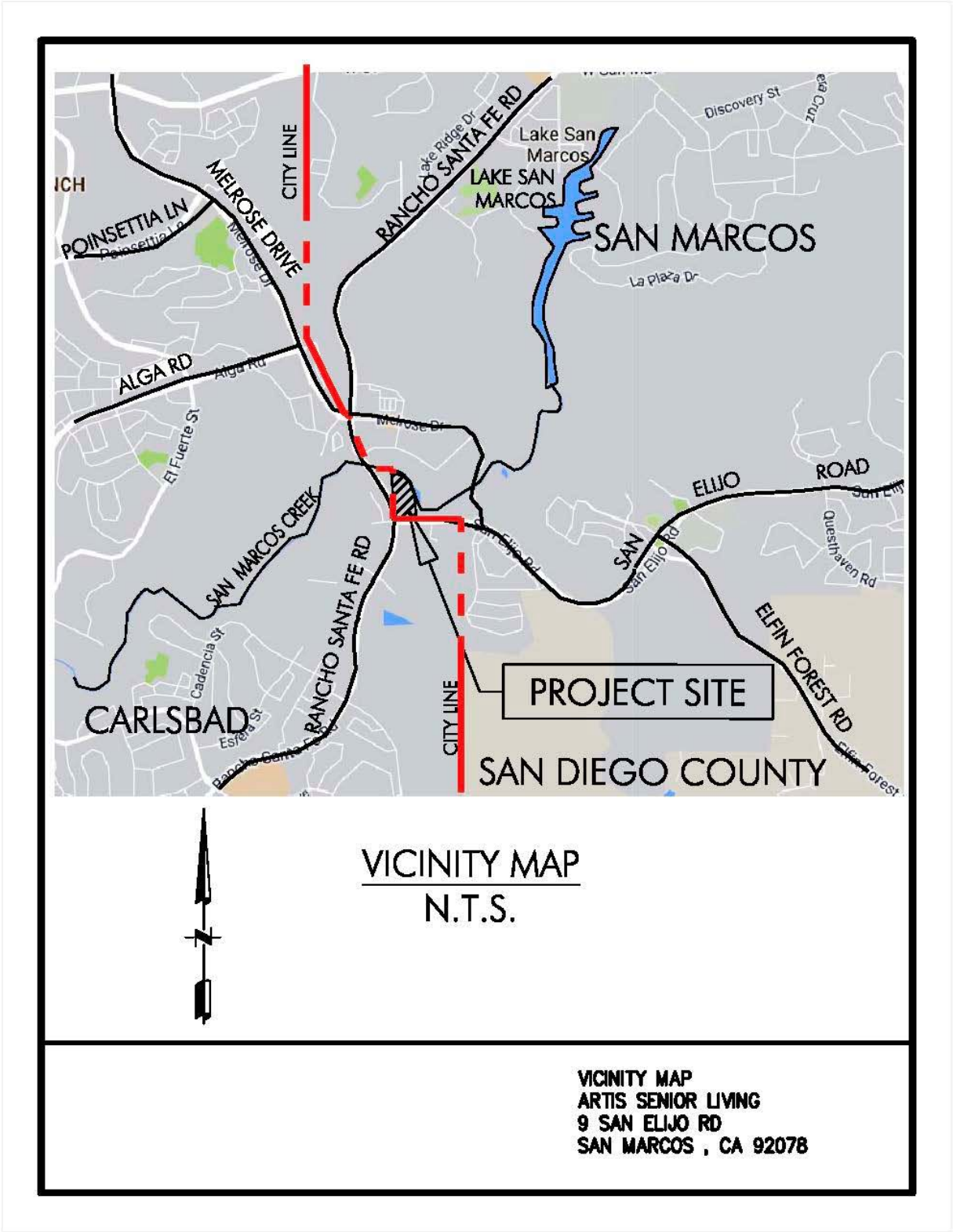
1.1 Purpose and Scope

The purpose of this report is to conduct the hydrology and hydraulic analysis for the project development in the City of San Marcos, County of San Diego,
The scope of this study is to analyze the results of existing and developed condition and to provide recommendations to the design of storm drain. Proposed storm water drainage facilities include storm drain pipe, catch basin and bio retention basin.
Proposed Bio-Retention Basin is addressed in the associated Storm Water Management Plan (SWMP) for the site.

1.2 Project Description

The project site, APN number 223-651-01-00, is located in the City of San Marcos, east of Rancho Santa Fe Road and north of San Elijo Road. The site is bound to the north and east by a descending dirt slope and San Marcos Greek beyond, to the south by San Elijo Road and condominiums beyond, and to the west by an RV parking lot and Rancho Santa Fe Road.

1.3 Vicinity Map



1.4 Existing Conditions

The site, previously graded, is currently vacant.
There are multiple slopes located at the perimeter of the subject site.
The majority of the subject site is relatively flat, with no major change in elevation. The site drains north towards San Marcos Greek at approximately 6%.
There is a concrete v-ditch to the west of the property in the City of Carlsbad, which runs parallel to the property line. Both the major area of the project site and the manufactured slope westerly of the property, discharge to the above-mentioned v-ditch, which goes to San Marcos Creek.
The rest of the site flows to an existing inlet, which is located at the east north corner of the property.

1.5 Proposed Conditions

The proposed development will consist of the construction of senior/assisted living facility, adjacent parking lot, utilities and a Water Quality Basin.
Proposed storm drain system will not alter the existing drainage pattern and will be ultimately discharged into San Marcos Greek.
Storm water will be collected by the catch basins and discharged through storm drain pipe into the water quality basin. Overflow from the water quality basin will be going into the San Marcos Greek.

2.0 HYDROLOGIC ANALYSIS

2.1 Existing Condition Hydrology Analysis

Design Method of determining flows based on the site size is chosen to be the Rational Method.

Ti from Figure 3-3,D=146', S=17.1%, C=0.3
Ti=6.7 min

Tt is taken from Figure 3-4, for Delta E=14', L=485'
Tt=3.7 min
Tc=Ti+Tt=6.7 min +3.7 min=10.4 min

Use the isopluvial maps (Appendix B of the Hydrology Manual) to read the precipitation over a 6- hour period (P6) and precipitation over a 24-hour period (P24) for the site. With P6 value determined from the worksheet (Figure 3-1 of the Hydrology Manual), find the intensity, I.

10 Year Storm Event

P6 = 1.9 inches, P24 = 3.25 inches. A=2.19ac, C=0.3 , Tc=10.4 min,
I10 = 3.15 in/hr
Soils Hydrologic Group-C
Imperviousness=0%.
C=0.30
Q50 2 = (CA)I = (0.30) (2.19) (3.15) = 2.06 cfs

50 Year Storm Event

P6 = 2.6 inches, P24 = 4.5 inches. A=2.19ac, C=0.3 , Tc=10.4 min,
I50 = 4.3 in/hr
Soils Hydrologic Group-C
Imperviousness=0%.
C=0.30
Q50 2 = (CA)I = (0.30) (2.19) (4.3) = 2.83 cfs

100 Year Storm Event

P6 = 3.0 inches, P24 = 5.1 inches. A=2.19ac, C=0.3 , Tc=10.4 min,
I100 = 4.80 in/hr
Soils Hydrologic Group-C
Imperviousness=0%.
C=0.30

Q50 2 = (CA)I = (0.30) (2.19) (4.8) = 3.15 cfs

2.2 Proposed Condition Hydrology Analysis

Ti is taken from Table 3-2, for L=100', Slope>10%,
Using Ti, fill in the worksheet provided in Figure 3-1 of the Hydrology Manual. Use the isopluvial maps (Appendix B of the Hydrology Manual) to read the precipitation over a 6- hour period (P6) and precipitation over a 24-hour period (P24) for the site. With P6 value determined from the worksheet (Figure 3-1 of the Hydrology Manual), find the
intensity, I

10 Year Storm Event

Ti for the length between Pt. 1 and Pt 2
P6 = 1.9 inches, and P24 = 3.25 inches. A=0.1 ac, C=0.63,
Ti=3.5 min
I10 = 5.0 in/hr
Imperviousness=61%.
C=0.69

Q10=(CA)I = (0.69) (0.1) (5.0) = 0.35 cfs
Tt for the length between point 2 and 3, L=436', I=3.7%, A=2.09 ac
The watercourse is a gutter and to calculate Tt it is necessary to know the water velocity, V, in the gutter.

Estimate Q avg
S avg=3.7%
Qavg = 3.0 cfs/acre.
Assume Qavg = Q10 2 + (Qavg)(A2-3)
Qavg = 0.35 cfs + (3.0 cfs/acre)(2.09 acres) =6.62 cfs

From Figure 3-6 of the Hydrology Manual, V = 4.8 fps Then: Tt= (436ft: 4.8ft/sec):60 =1.5 min, accept 2.0 min
Tc=Ti + Tt =3.5 + 2.0 = 5.5 minutes

With P6 value determined from the worksheet (Figure 3-1 of the Hydrology Manual), find the Intensity, I10. I=4.9 in/hr
Q10= (CA)I=0.69*2.19*4.9=7.40 cfs

50 Year Storm Event

Ti for the length between Pt. 1 and Pt 2
P6 = 2.6 inches, and P24 = 4.5 inches. A=0.1 ac, C=0.63,
Ti=3.5 min
I10 = 5.0 in/hr
Imperviousness=61%.
C=0.69
Q10=(CA)I = (0.69) (0.1) (6.8) = 0.47 cfs

Tt for the length between point 2 and 3, L=436', I=3.7%, A=2.09 ac
The watercourse is a gutter and to calculate Tt it is necessary to know the water velocity, V, in the gutter.

Qavg = 0.47 cfs + (3.0 cfs/acre)(2.09 acres) =6.74 cfs
From Figure 3-6 of the Hydrology Manual, V = 4.2 fps Then: Tt= (436ft:4.8ft/sec)60 =1.5 min, accept 2.0 min
Tc=Ti + Tt =3.5 + 2.0 = 5.5 minutes

With P6 value determined from the worksheet (Figure 3-1 of the Hydrology Manual), find the Intensity, I50. I=6.5 in/hr
Q50= (CA)I=0.69*2.19*6.5=9.82 cfs

<u>100 Year Storm Event</u>

Ti for the length between Pt. 1 and Pt 2
P6 = 1.9 inches, and P24 = 3.25 inches. A=0.1 ac, C=0.63,
Ti=3.5 min
I100 = 7.8 in/hr
Imperviousness=61%.
C=0.69
Q100=(CA)I = (0.69) (0.1) (7.8) = 0.54 cfs

Tt for the length between point 2 and 3, L=436', I=3.7%, A=2.09 ac
The watercourse is a gutter and to calculate Tt it is necessary to know the water velocity, V, in the gutter.

To find V, assume an average Q
Estimate Qavg
Savg=3.7%
Qavg = 3.0 cfs/acre.
Assume QAVG = Q50 2 + ((Qavg)(A2-3)
Qavg = 0.54 cfs + (3.0 cfs/acre)(2.09 acres) =6.81 cfs

From Figure 3-6 of the Hydrology Manual, V = 4.8 fps Then: Tt= (436ft:4.8ft/sec)60 =1.5 min, accept 2.0 min
Tc=Ti + Tt =3.5 + 2.0 = 5.5 minutes

With P6 value determined from the worksheet (Figure 3-1 of the Hydrology Manual), find the Intensity, I100. I=7.5 in/hr
Q100=(CA)I=0.69*2.19*7.5=11.33 cfs

3.0 LOW IMPACT DEVELOPMENT

3.1Infitration

The Bio-Filtration Basin will treat the parking lot, roof and driveway area. (WQMP is provided separately).
The information about the infiltration rate at deeper layers may be required later in the engineering design phase, and different types of BMP may be considered.

4.0 CONCLUSIONS

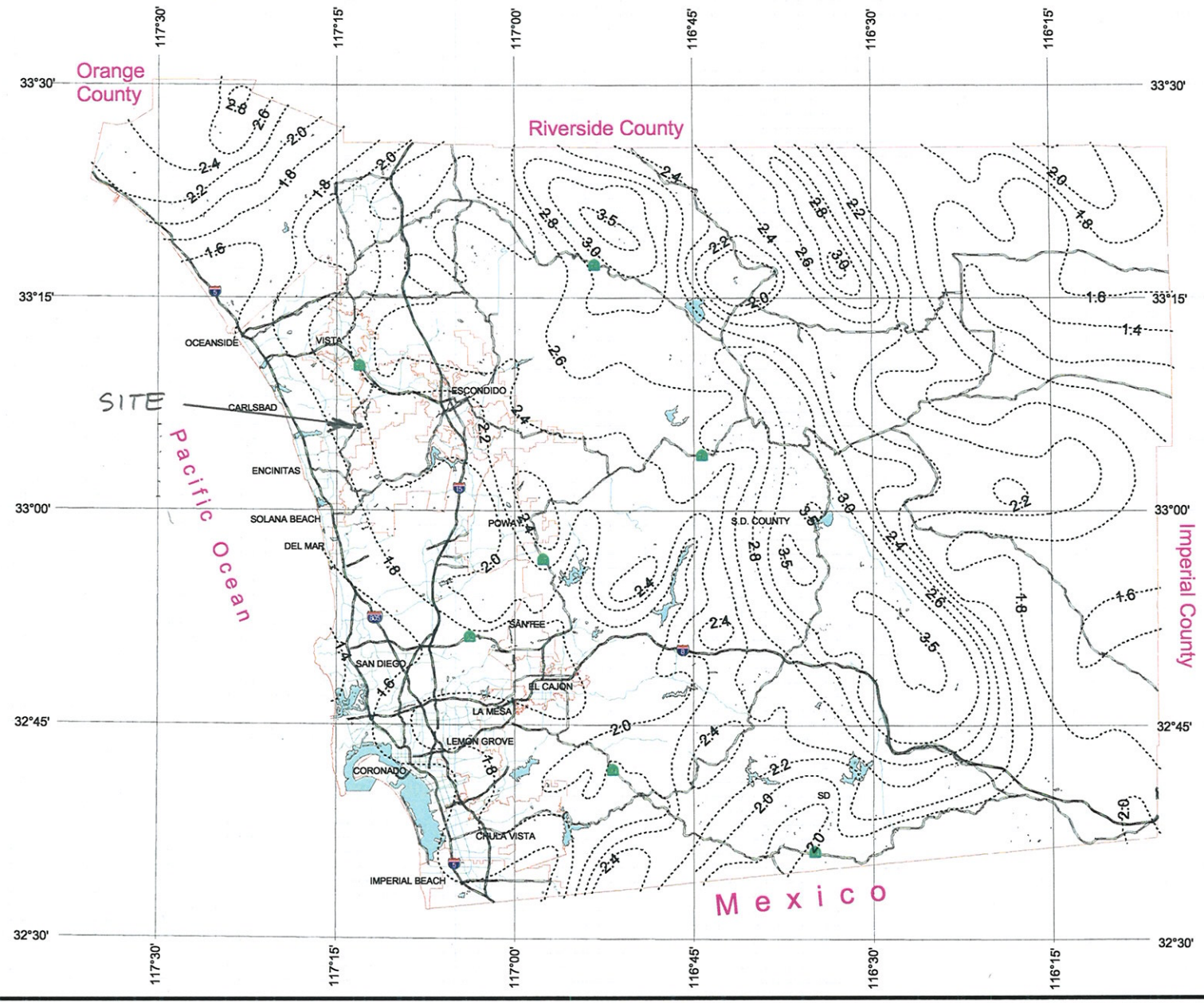
After development, impervious surface will increase in the site. Total runoff will increase and is summarized in the table below. A proposed Water Quality Basin will be designed and installed to handle both of first ¾ flush in water quality purpose and detaining of additional runoff in proposed development condition. A detailed design and calculations for all proposed catch basins, storm drain pipe and water Quality Basin will be performed during final engineering design phase.

	Q peak discharge 10 Year Storm Event	Q peak discharge 50 Year Storm Event	Q peak discharge 100 Year Storm Event
Existing Condition	2.06 cfs	2.83 cfs	3.15 cfs
Proposed Condition	7.40 cfs	9.82 cfs	11.33 cfs

APPENDIX A (Supporting Information)

County of San Diego Hydrology Manual

Rainfall Isopluvials



10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

1.9"

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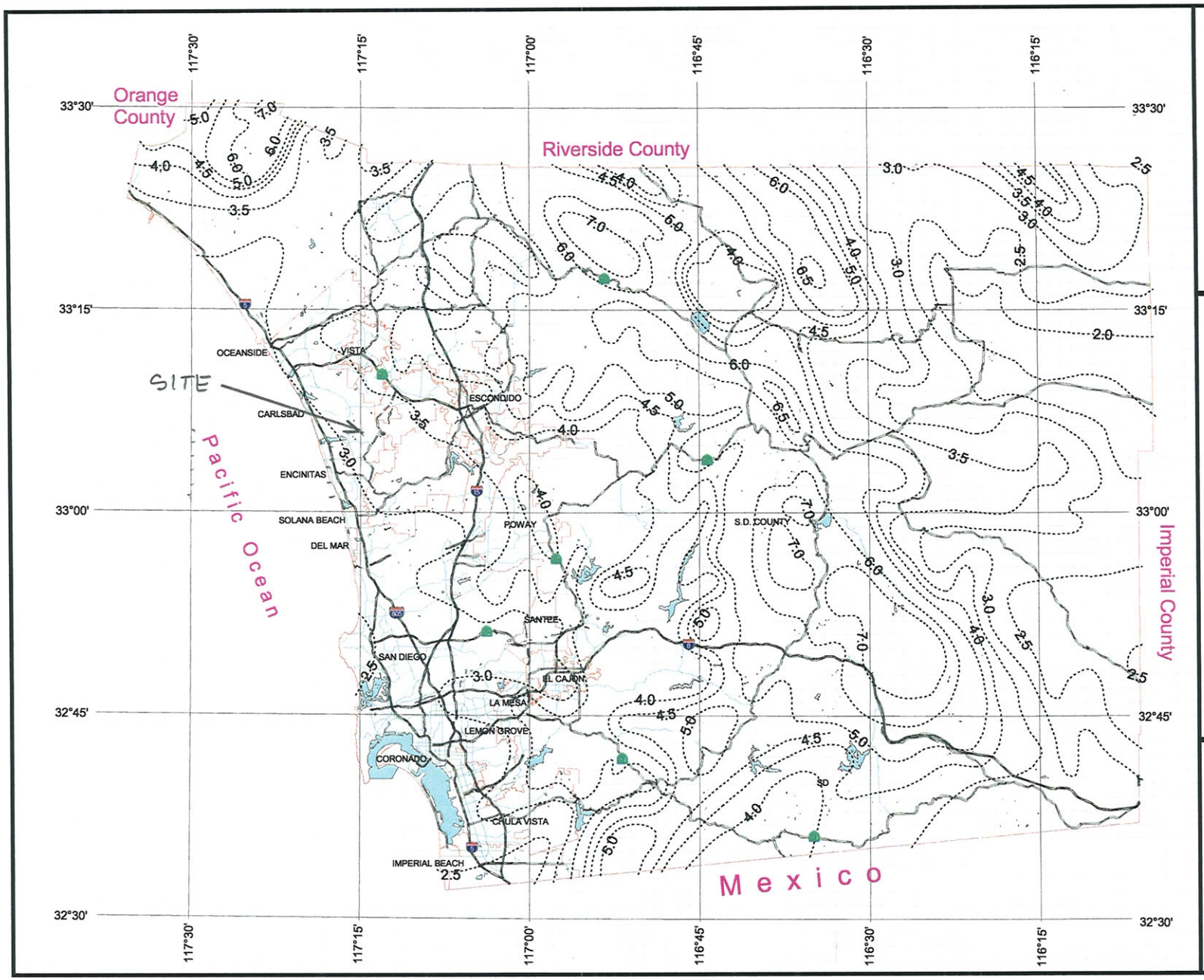
N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours

Isopluvial (inches)

3.25"

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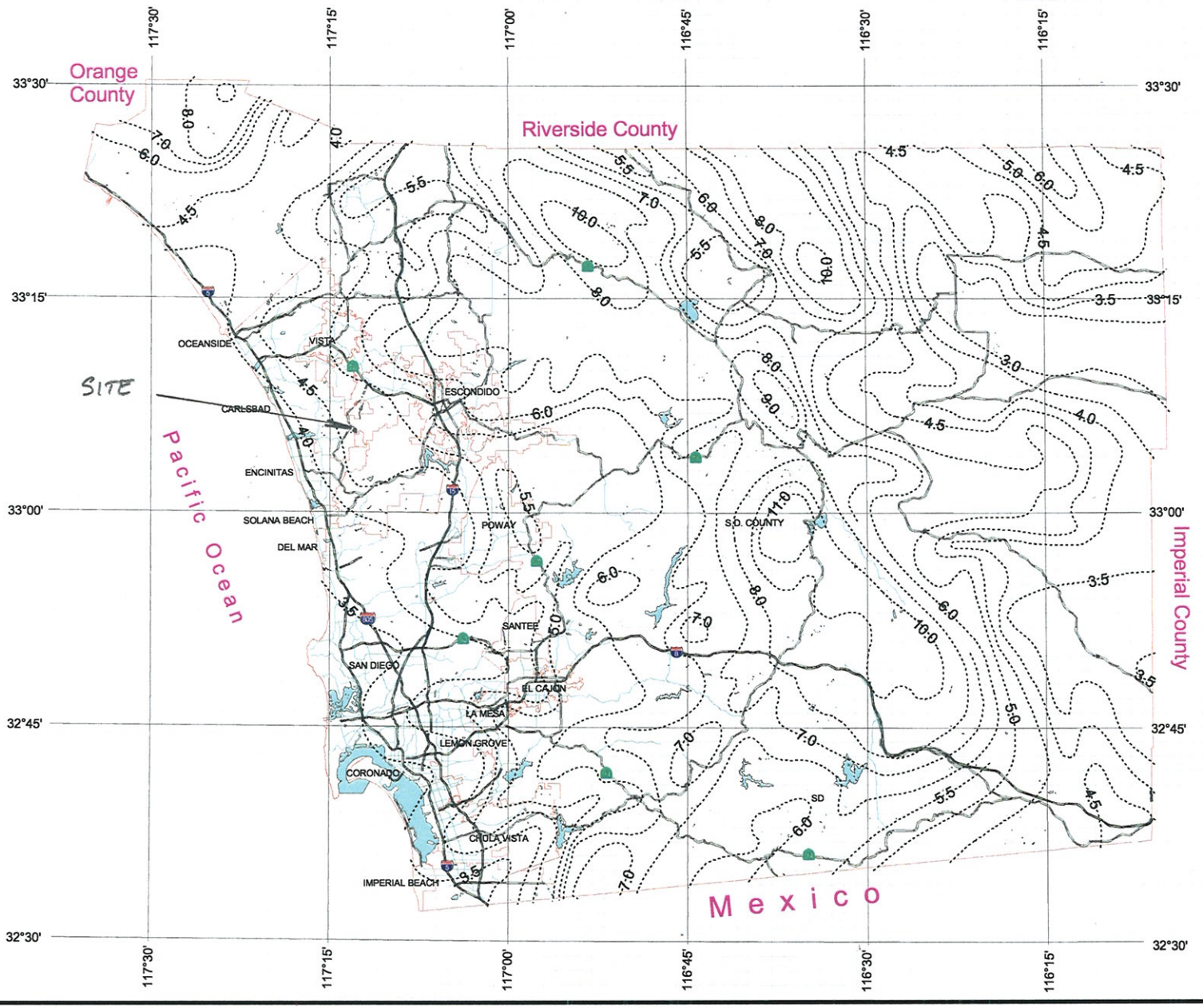
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials



50 Year Rainfall Event - 24 Hours

Isopluvial (inches)

4.5"

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S

3 0 3 Miles

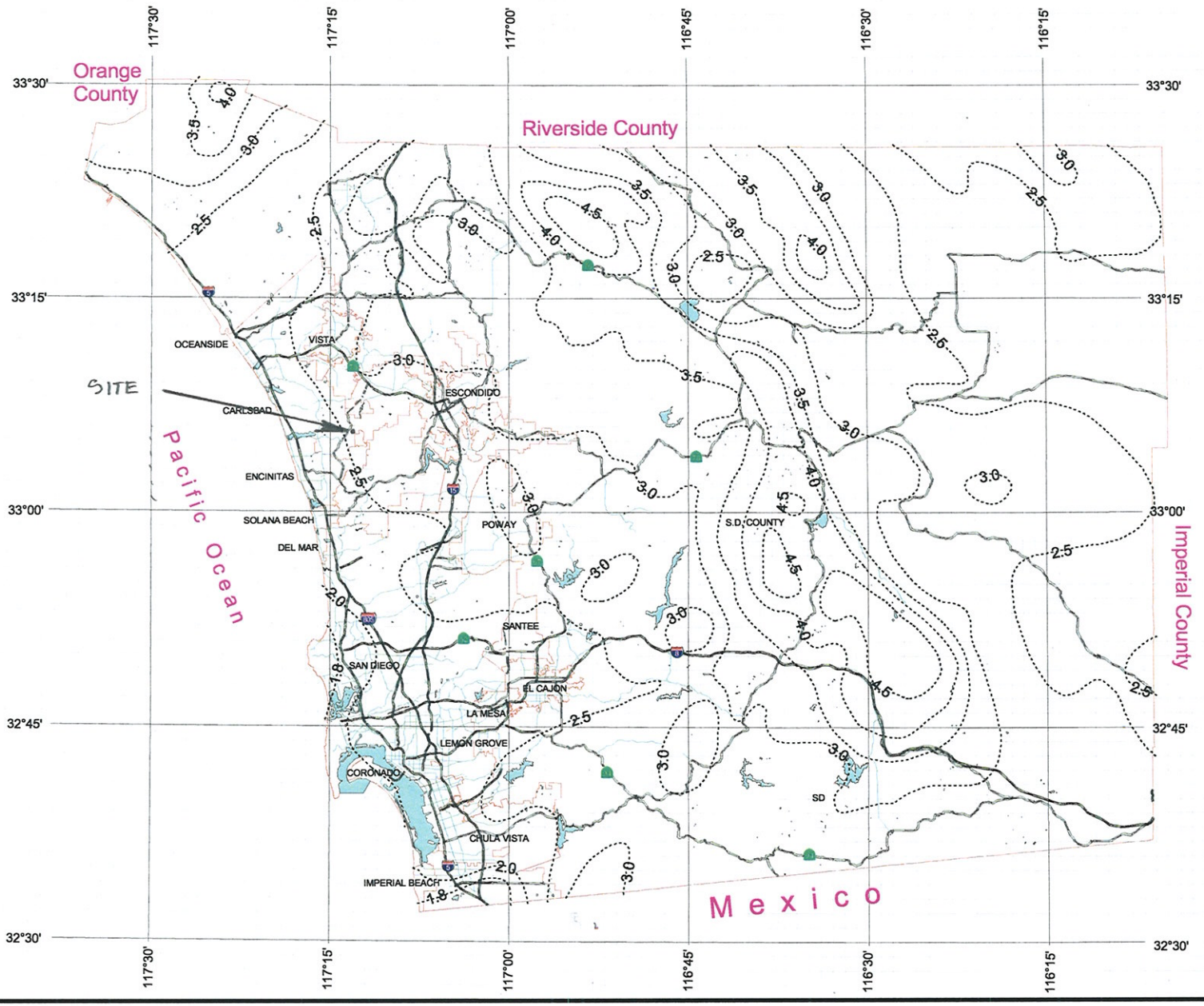
County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

2.6"



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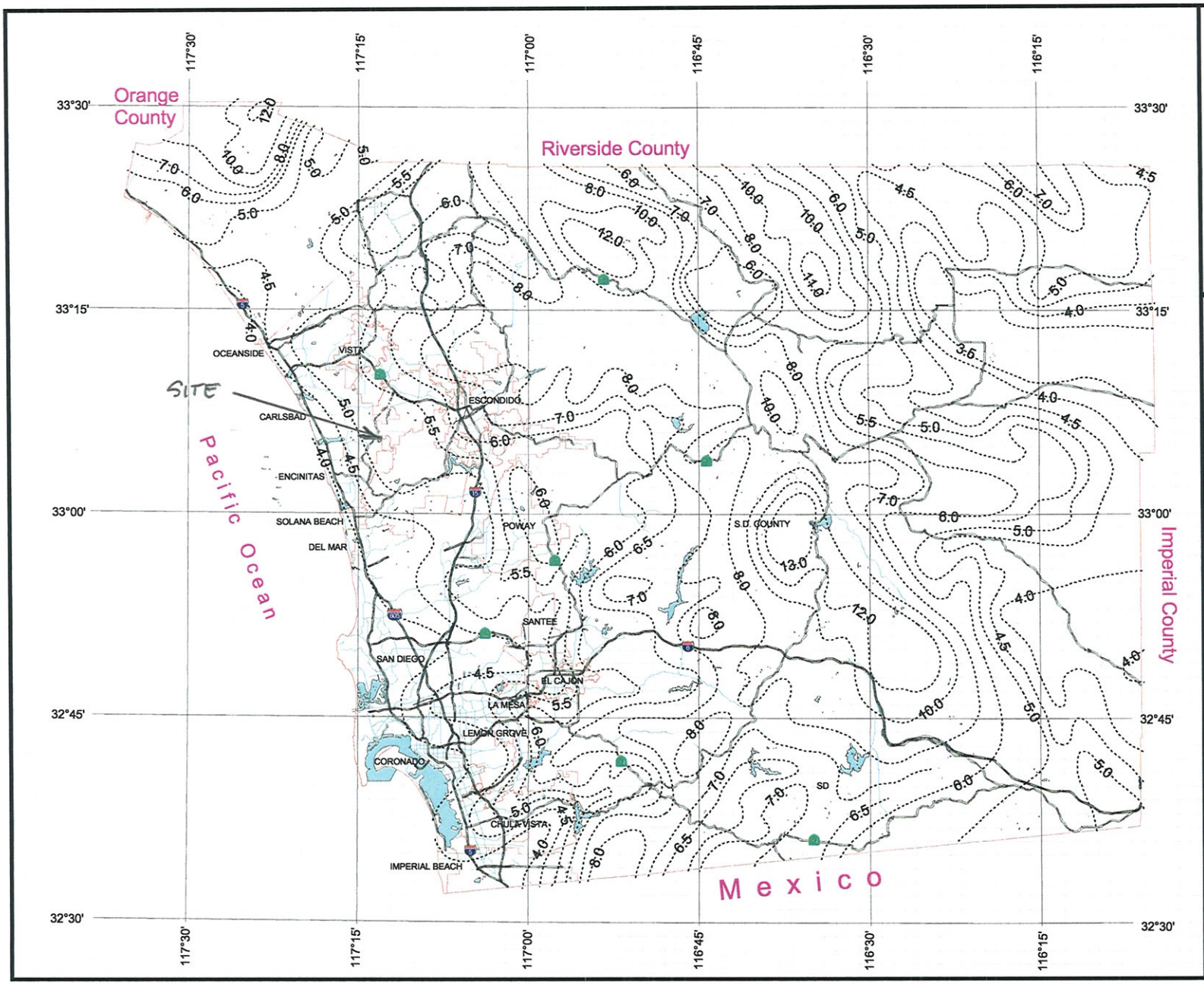
County of San Diego Hydrology Manual

Rainfall Isopluvials



100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

5.1"

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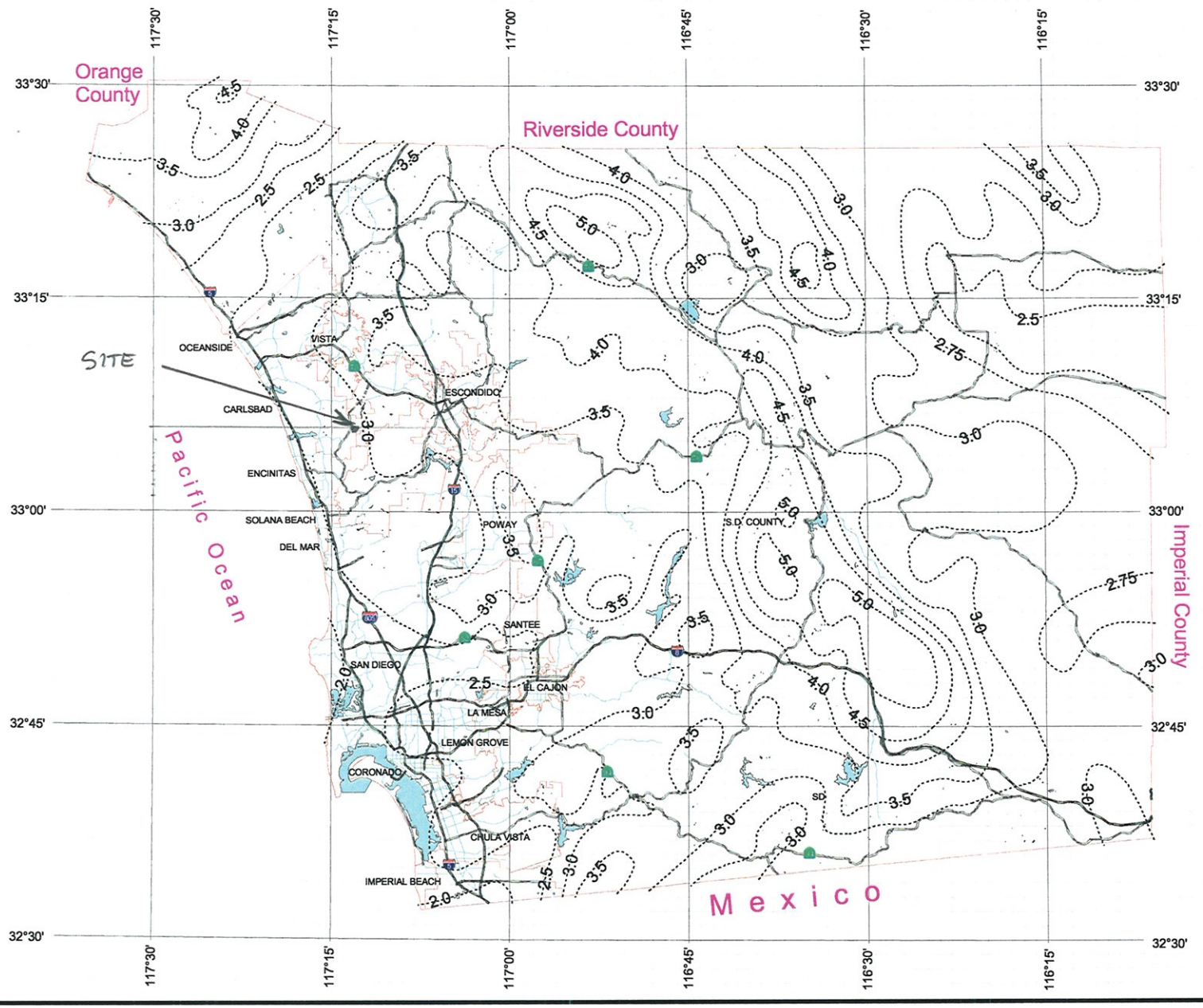
3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

3.0"

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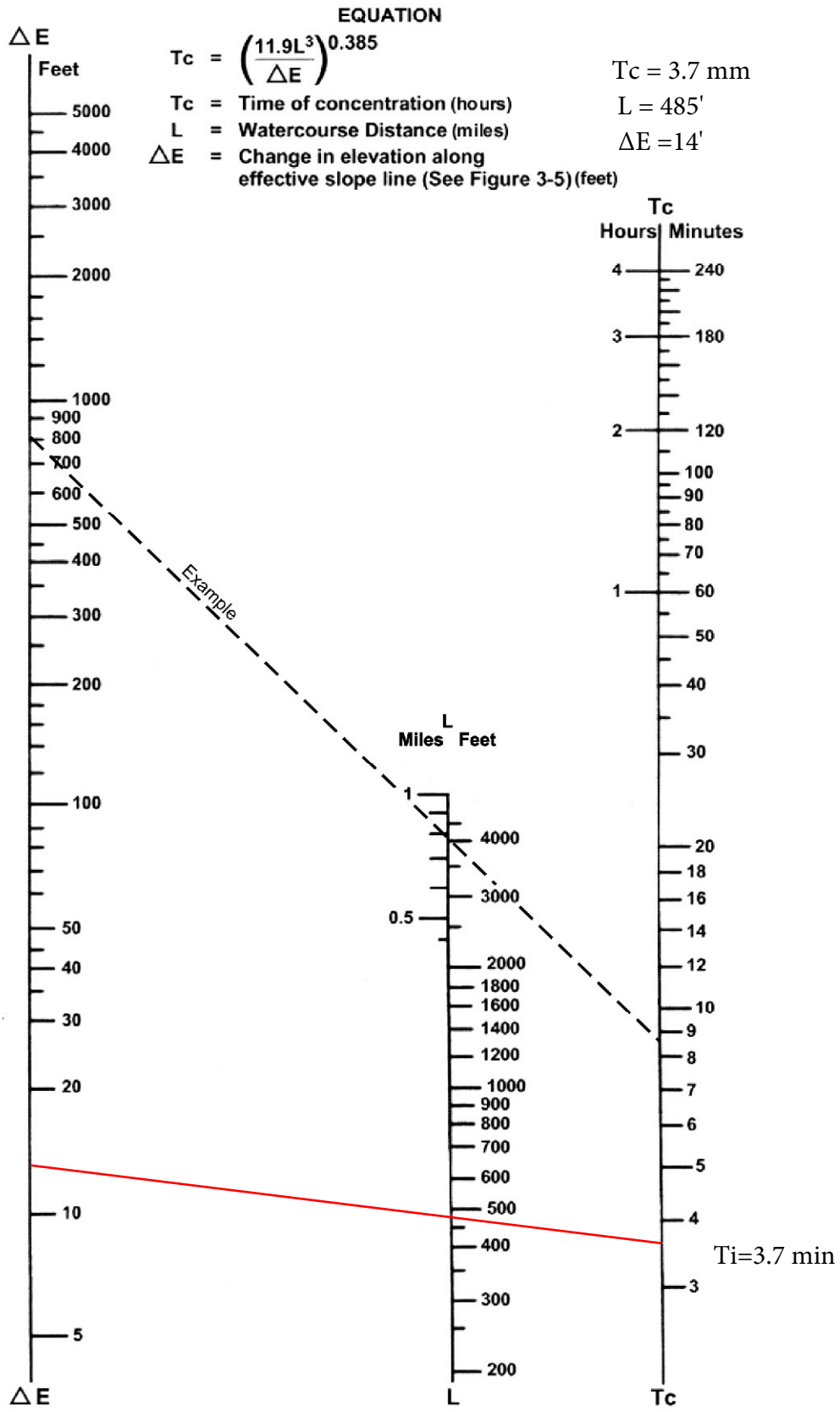
N W E S

3 0 3 Miles

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

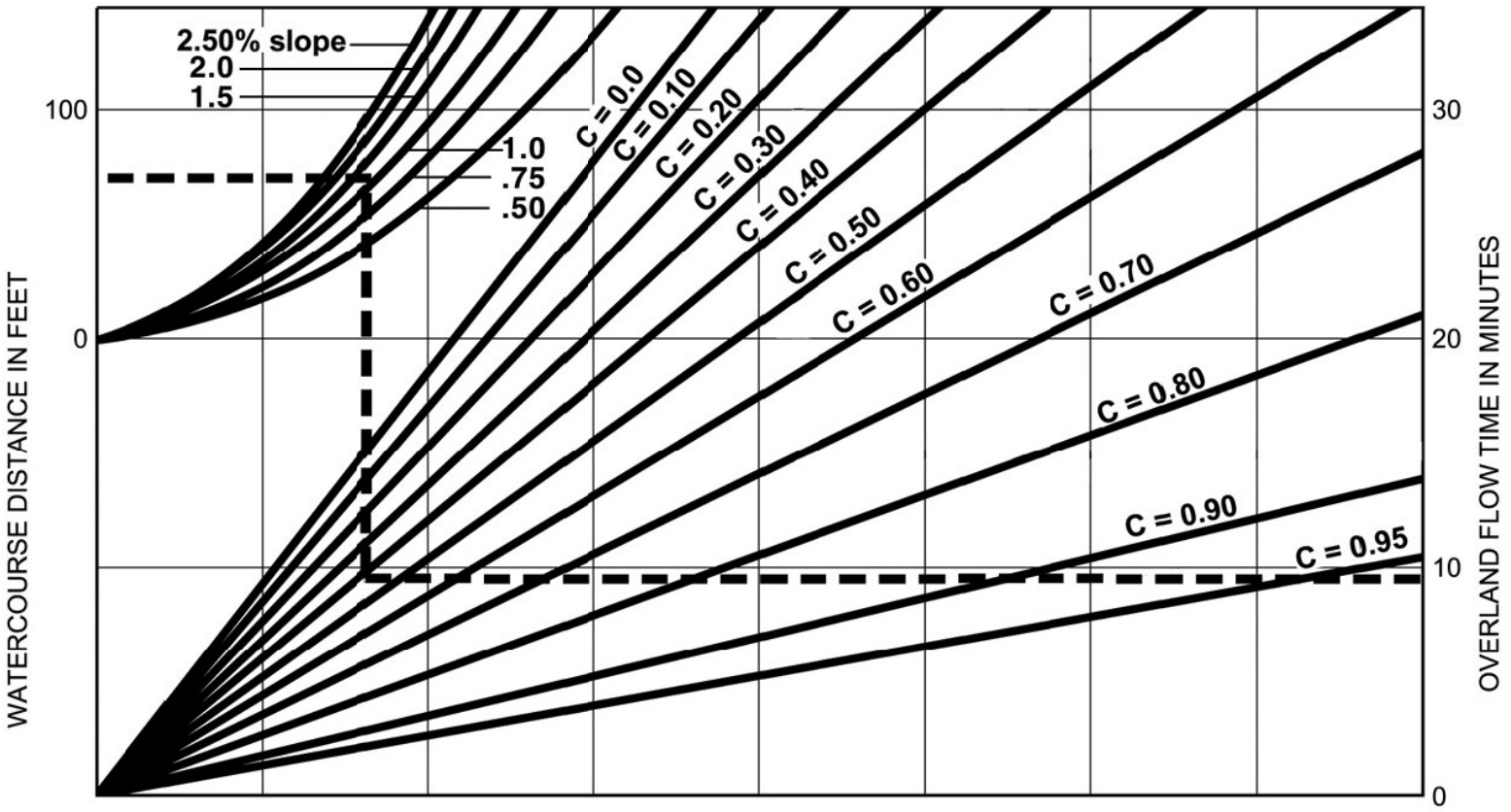
Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



EXAMPLE:

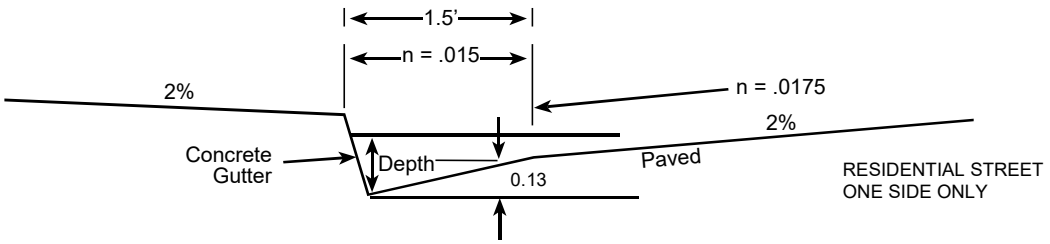
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

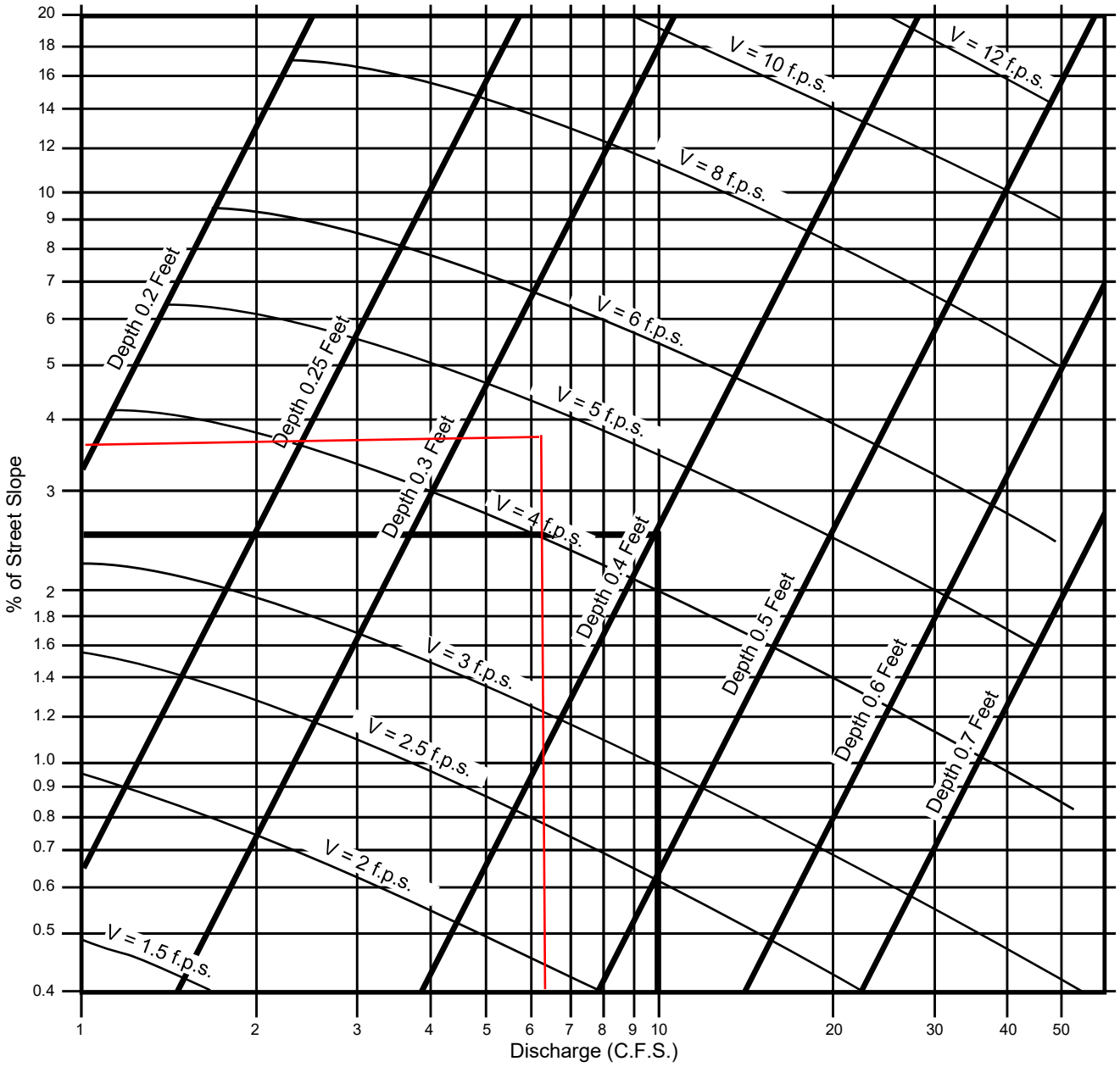
$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE 3-3

Rational Formula - Overland Time of Flow Nomograph





EXAMPLE:
Given: Q = 10 S = 2.5%
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

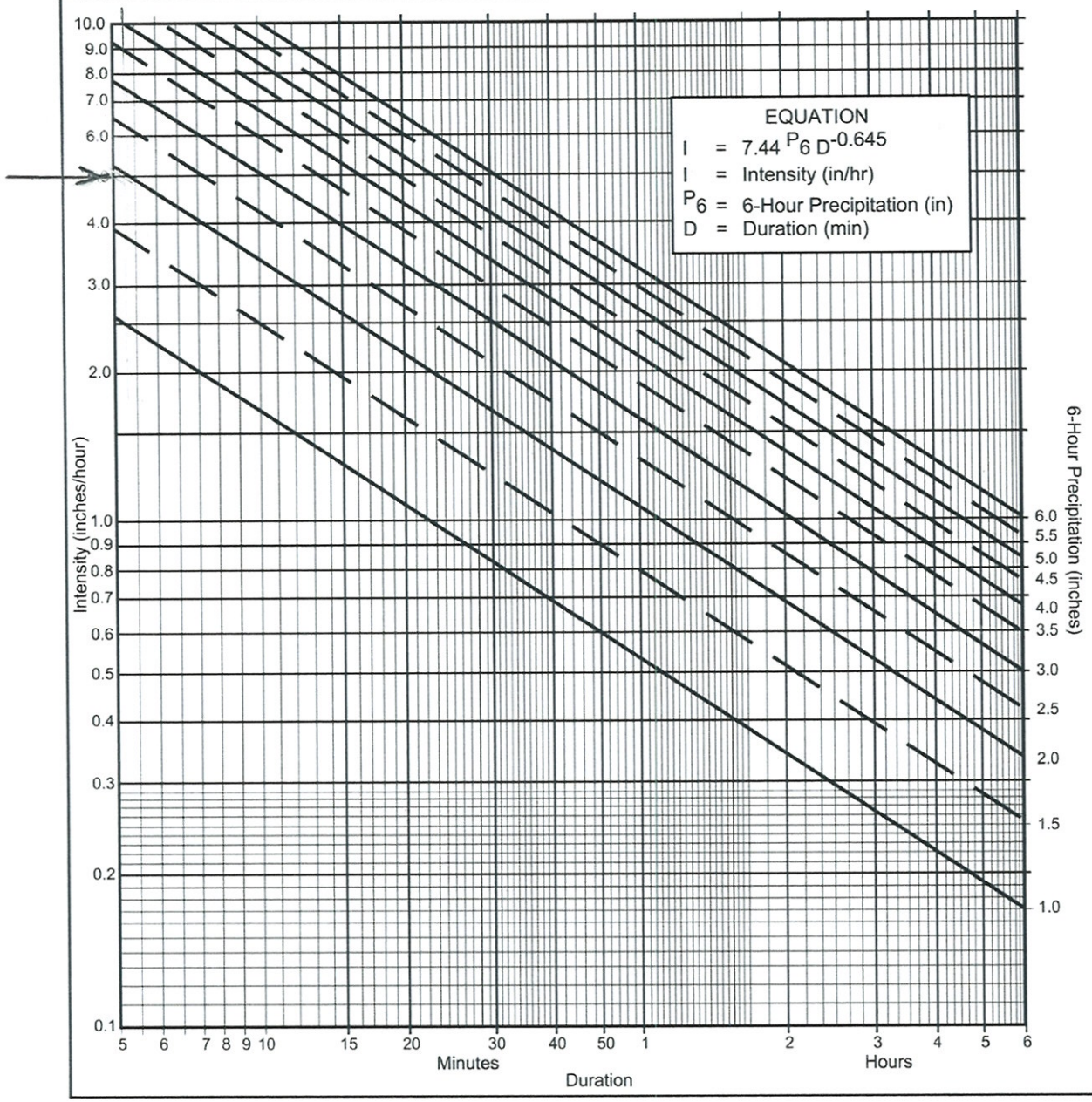
SOURCE: San Diego County Department of Special District Services Design Manual

Gutter and Roadway Discharge - Velocity Chart

FIGURE

3-6

INITIAL PROP. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 10 year

(b) P_6 = 1.9 in., P_{24} = 3.25, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 1.9 in.

(d) t_x = 5.0 min.

(e) I = 5 in./hr.

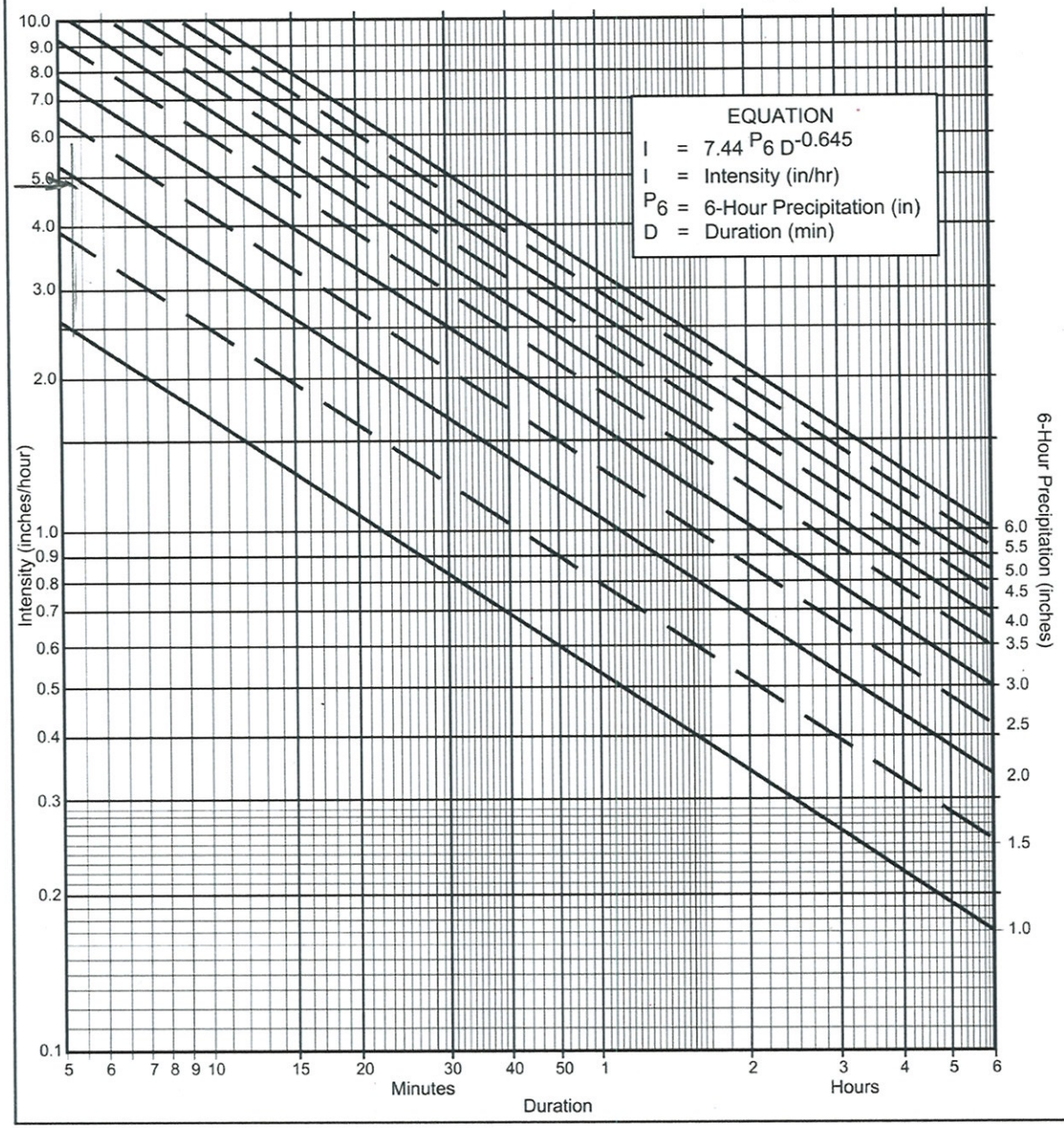
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

PROP. CONDITION



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(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 10 year

(b) P_6 = 1.9 in., P_{24} = 3.25, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 1.9 in.

(d) t_x = 5.5 min.

(e) I = 4.9 in./hr.

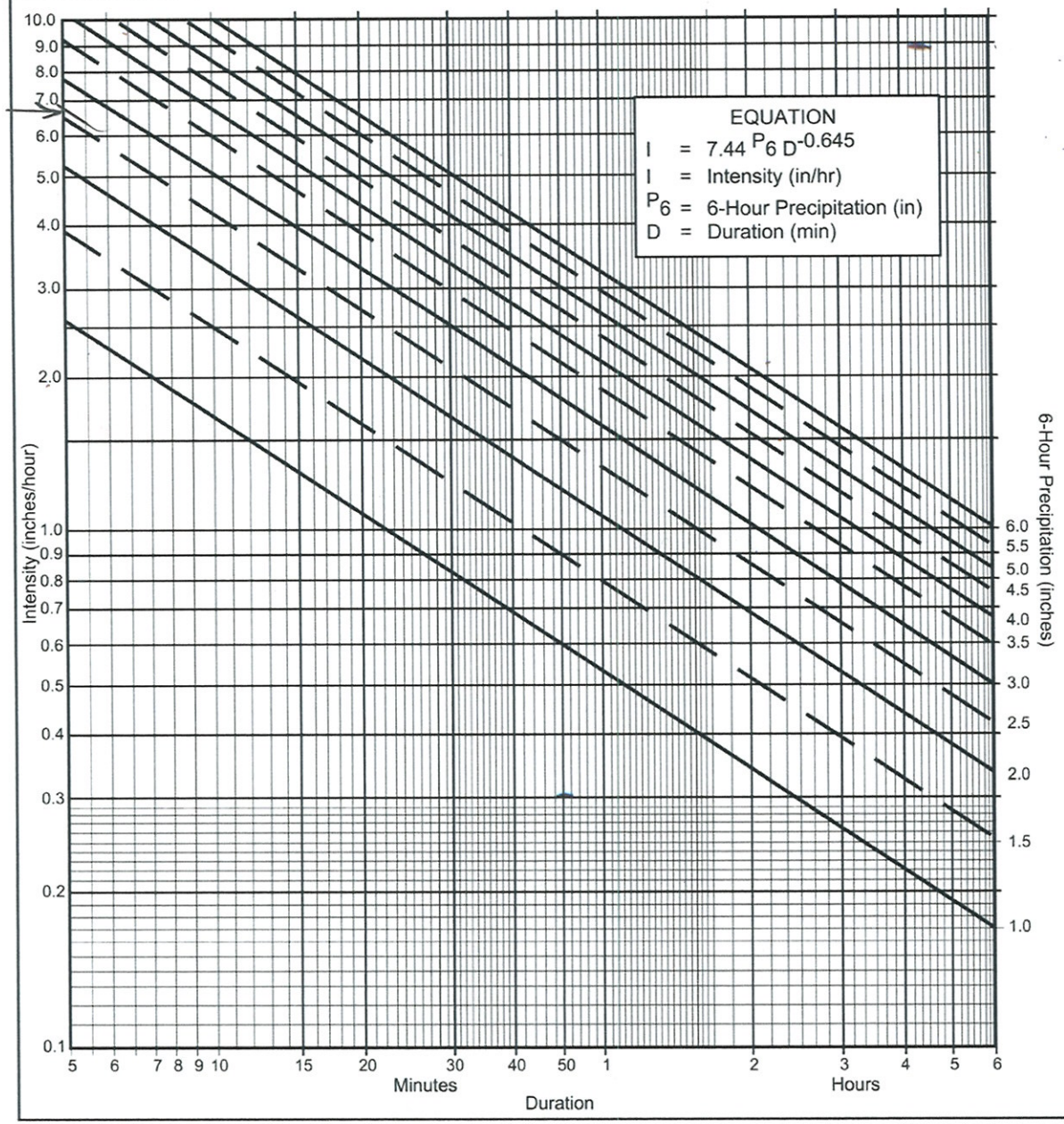
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

INITIAL PROP. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 50 year

(b) P_6 = 2.6 in., P_{24} = 4.5, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 2.6 in.

(d) t_x = 5 min.

(e) I = 6.8 in./hr.

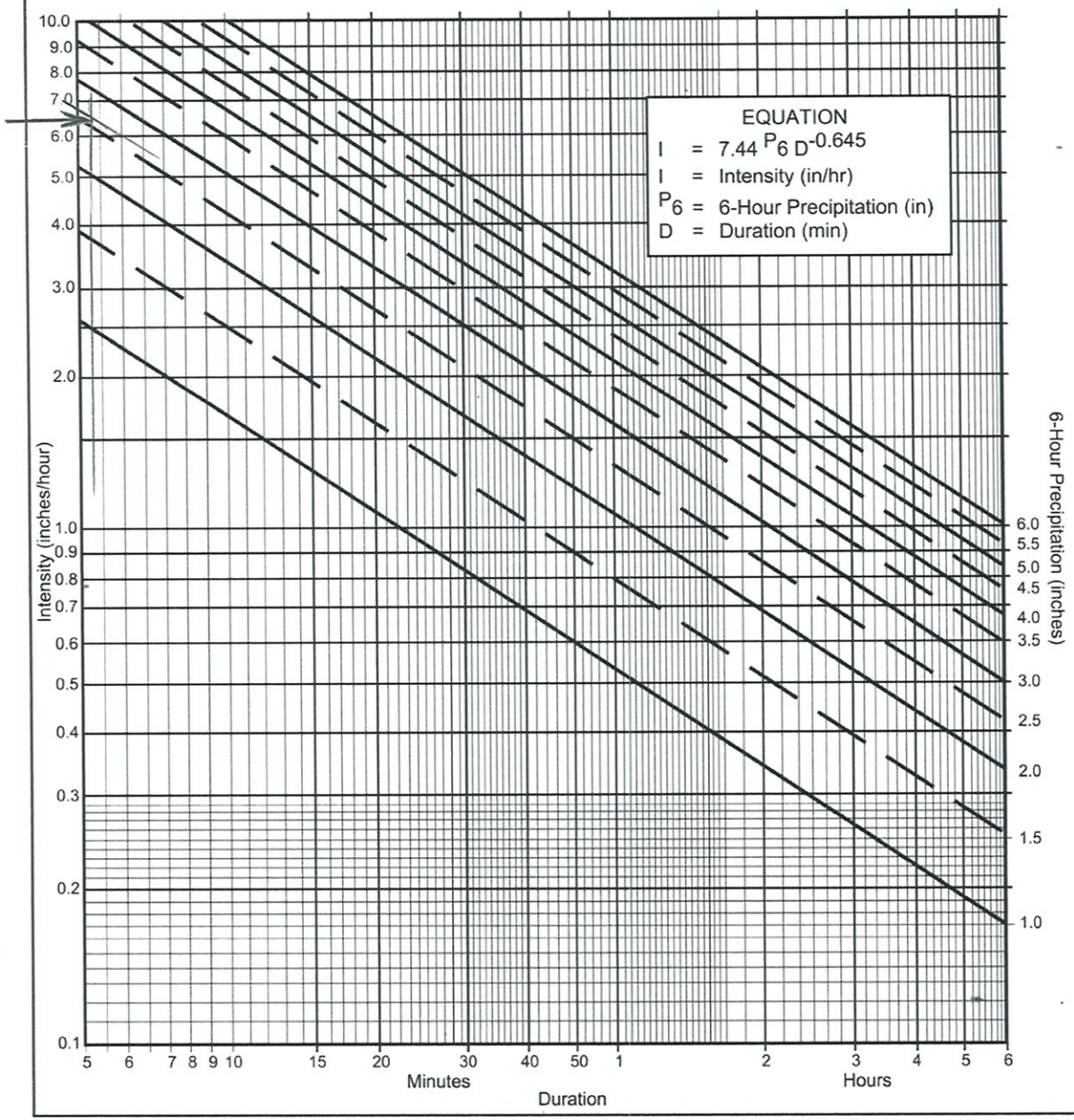
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

PROP. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 50 year

(b) P_6 = 2.6 in., P_{24} = 4.5, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 2.6 in.

(d) t_x = 5.5 min.

(e) I = 6.5 in./hr.

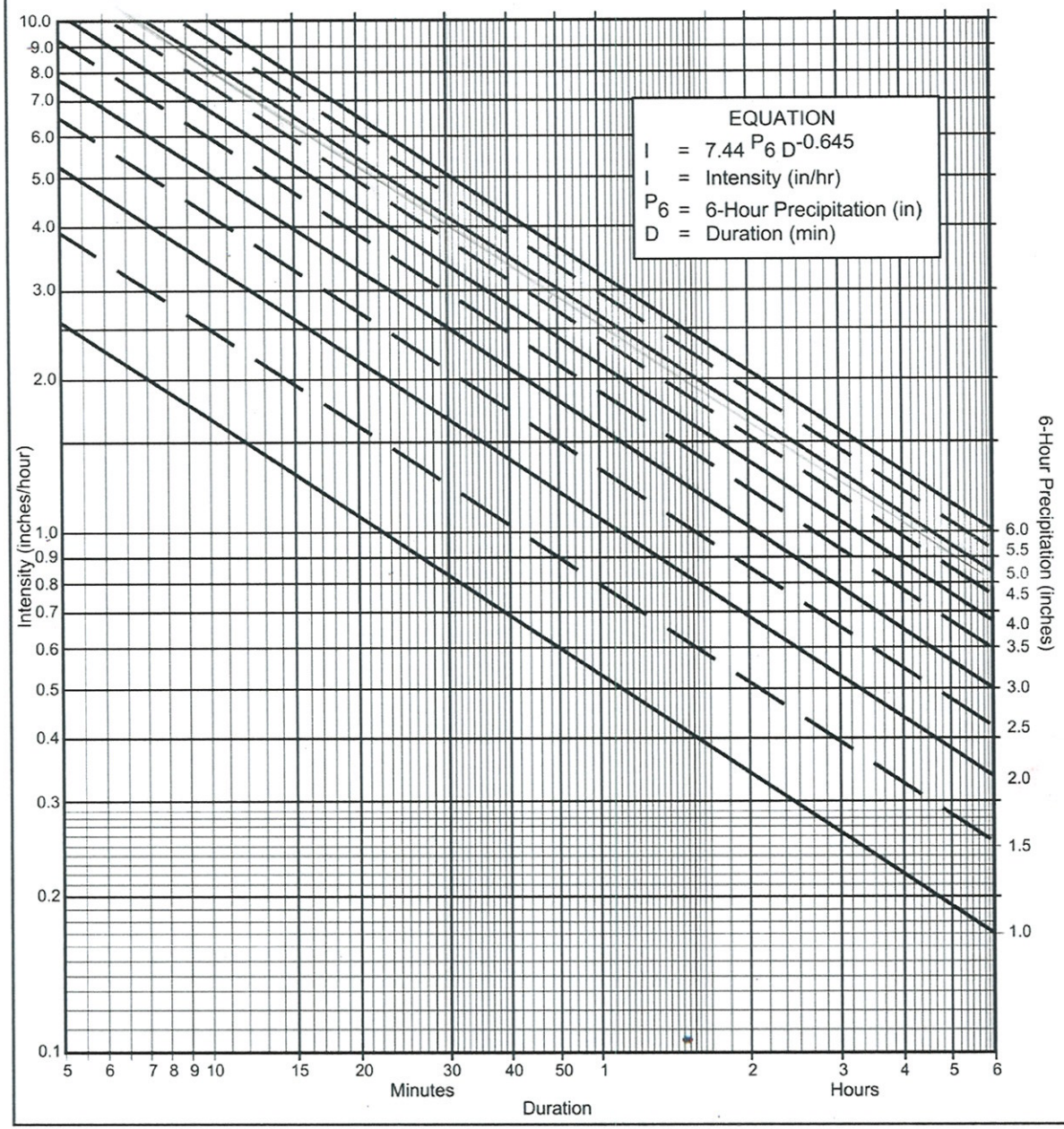
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

INITIAL PROP CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.0 in., P_{24} = 5.1, $\frac{P_6}{P_{24}}$ = 59 %(2)

(c) Adjusted P_6(2) = 3.0 in.

(d) t_x = 5.0 min.

(e) I = 7.8 in./hr.

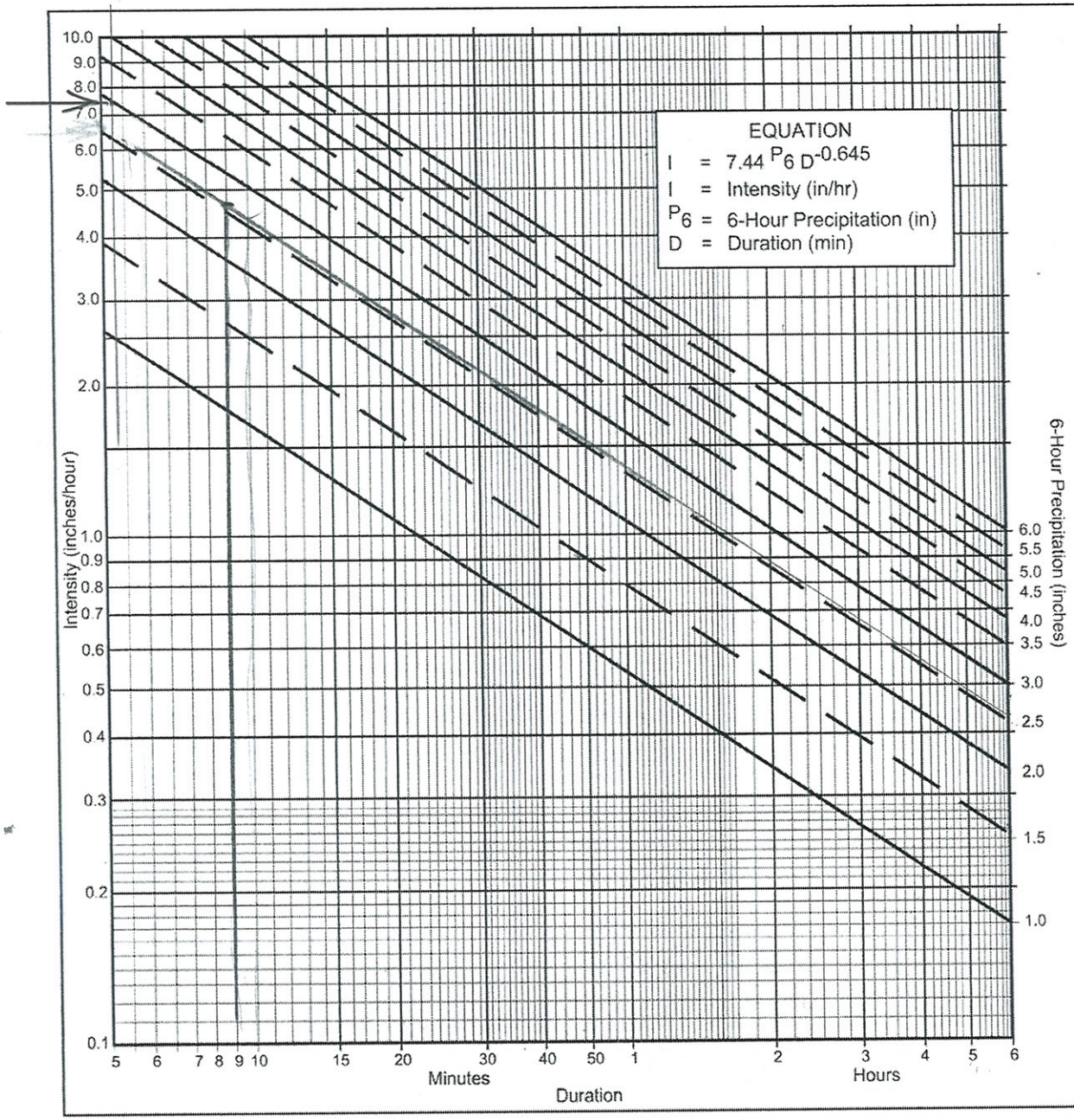
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

PROSP. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.0 in., P_{24} = 5.1, $\frac{P_6}{P_{24}}$ = 59 %(2)

(c) Adjusted P_6(2) = 3.0 in.

(d) t_x = 5.5 min.

(e) I = 7.5 in./hr.

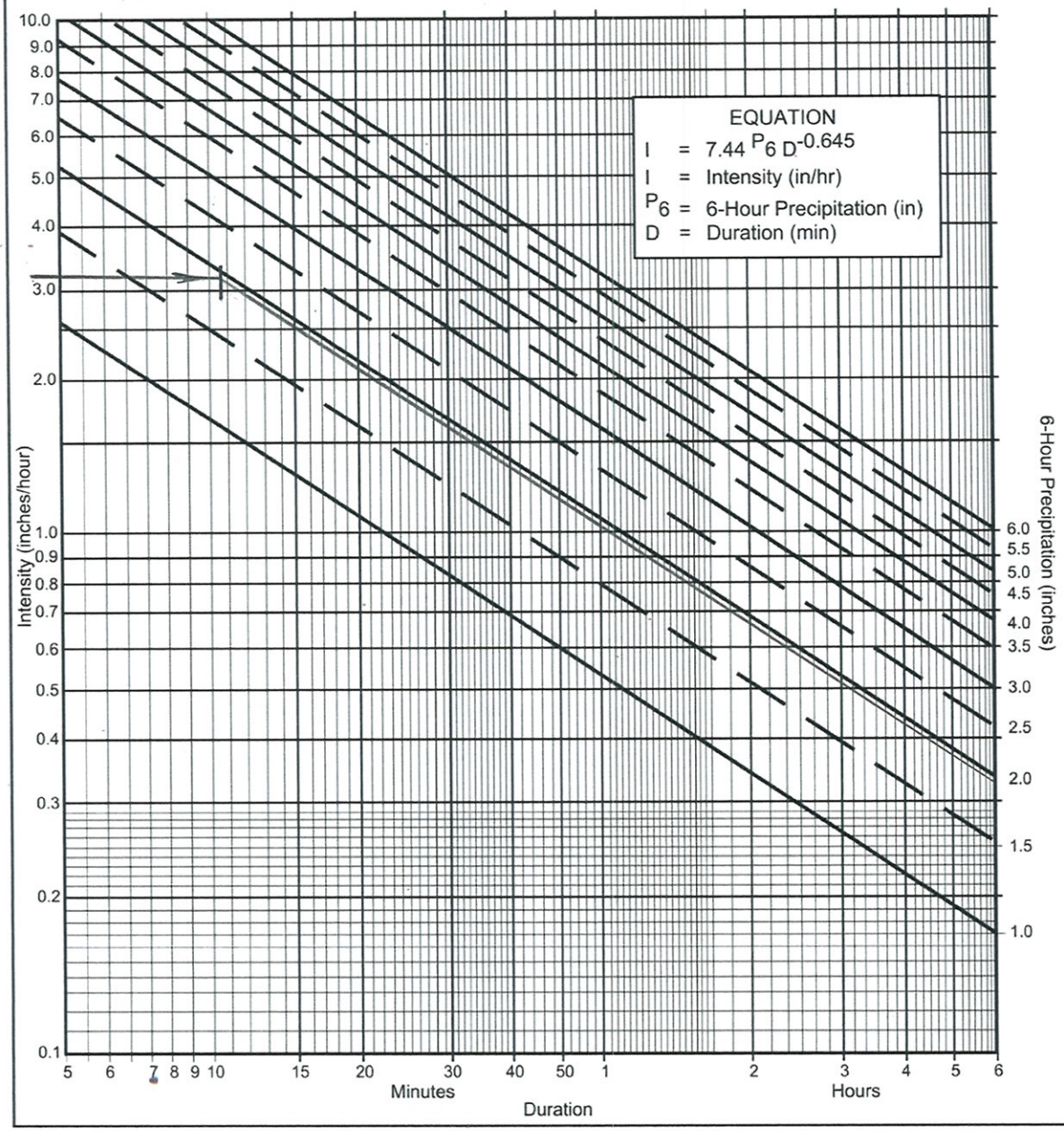
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

EXIST. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 10 year

(b) P_6 = 1.9 in., P_{24} = 3.25, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 1.9 in.

(d) t_x = 10.4 min.

(e) I = 3.15 in./hr.

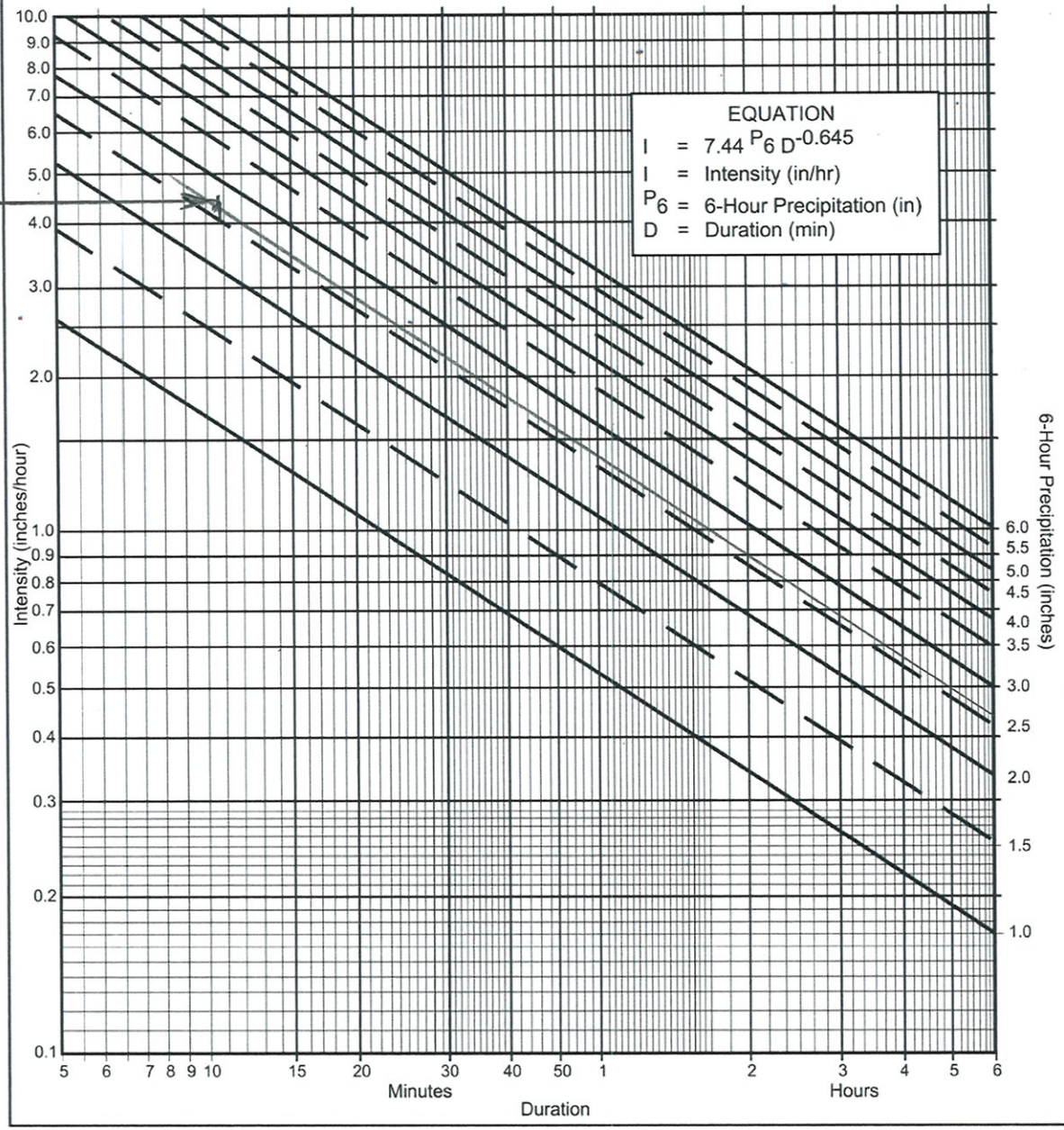
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

EXIST. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 50 year

(b) P_6 = 2.6 in., P_{24} = 4.5, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = 10.4 min.

(e) I = 4.3 in./hr.

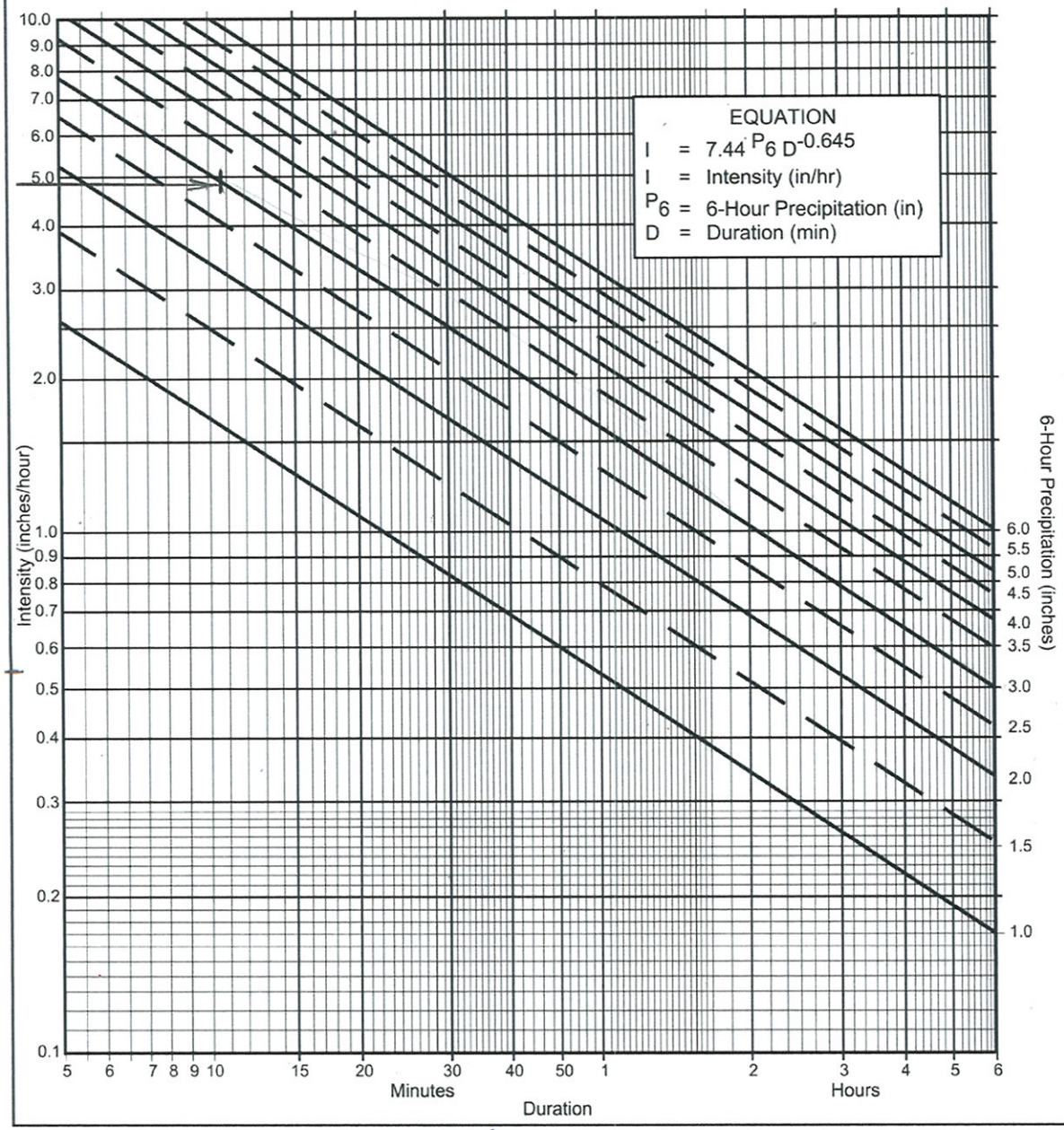
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

EXIST. CONDITION



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.0 in., P_{24} = 5.1, $\frac{P_6}{P_{24}}$ = 59 %(2)

(c) Adjusted P_6(2) = 3.0 in.

(d) t_x = 10.4 min.

(e) I = 4.8 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

APPENDIX B (Hydraulic Calculations)

Minimum Slope for 12" SD Flowing Full

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Slope

Input Data

Roughness Coefficient	0.009	
Channel Slope	0.03716	ft/ft
Normal Depth	1.00	ft
Diameter	1.00	ft
Discharge	9.92	ft³/s

Results

Channel Slope	0.03716	ft/ft
Normal Depth	1.00	ft
Flow Area	0.79	ft²
Wetted Perimeter	3.14	ft
Hydraulic Radius	0.25	ft
Top Width	0.00	ft
Critical Depth	0.99	ft
Percent Full	100.0	%
Critical Slope	0.03477	ft/ft
Velocity	12.63	ft/s
Velocity Head	2.48	ft
Specific Energy	3.48	ft
Froude Number	0.00	
Maximum Discharge	10.67	ft³/s
Discharge Full	9.92	ft³/s
Slope Full	0.03716	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Minimum Slope for 12" SD Flowing Full

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.99	ft
Channel Slope	0.03716	ft/ft
Critical Slope	0.03477	ft/ft

APPENDIX C (Geotechnical Report)

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ARTIS SENIOR LIVING FACILITY
NEC OF SAN ELIJO ROAD AND PASEO PLOMO
SAN MARCOS, CALIFORNIA

PROJECT NO. 112-17054
SEPTEMBER 5, 2017

PREPARED FOR:

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FRESNO, CA 93721

ATTENTION: MR. MIKE C. BOGNA

PREPARED BY:

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1100 OLYMPIC DRIVE, SUITE 103
CORONA, CALIFORNIA 92881
(951) 273-1011

test reports, which are also included in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the subsurface soils generally consisted of 3 to 8 feet of undocumented fill soils across the subject site. The undocumented fill soils encountered generally consisted of dense to very dense silty sands with varying gravel content. The encountered fill soils were found to be inconsistent and appeared to have been placed without engineering control. The boring logs indicate that the undocumented fills in these areas are poorly consolidated and generally underlain by potentially compressible weathered rock. The undocumented fills will require removal and compaction.

Below the near surface fill soils, very dense weathered rock with varying silt and sand content were encountered. This granitic rock is known as the "Escondido Creek Granodiorite" and it was found throughout the site. The rock material exhibited a variable weathering pattern ranging from completely weathered decomposed granite to outcrops of fresh, extremely strong, hard rock that will require blasting to excavate. Granitic units generally exhibit adequate bearing and slope stability characteristics and cut slopes excavated at an inclination of 1.5:1 (H:V), or flatter should be stable to the proposed heights if free of adversely oriented joints or fractures.

Field and laboratory tests suggest that these soils along with the fill soils are moderately strong and slightly compressible. Penetration resistance, measured by the number of blows required to drive a Modified California sampler or a Standard Penetration Test (SPT) sampler, ranged from 53 to over 50 blows per foot. Representative soil samples consolidated approximately 0.3 to 0.9 percent under a 2-ksf load when saturated. Representative soil samples had angles of internal friction of 33 and 34 degrees.

The above is a general description of soil conditions encountered at the site in the borings drilled for this investigation. For a more detailed description of the soil conditions encountered, please refer to the boring logs in Appendix A.

EXPANSION POTENTIAL

The near-surface fill soils encountered at the site have been identified through laboratory testing as having a low expansion potential. Expansive soils have the potential to undergo volume change, or shrinkage and swelling, with changes in soil moisture. As expansive soils dry, the soil shrinks; when moisture is reintroduced into the soil, the soil swells.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Groundwater was not encountered at any of the borings drilled during the site visit to the subject site.

It should be recognized that water table elevation might fluctuate with time. The depth to groundwater can be expected to fluctuate both seasonally and from year to year. Fluctuations in the groundwater level

may occur due to variations in precipitation, irrigation practices at the site and in the surrounding areas, climatic conditions, flow in adjacent or nearby canals, pumping from wells and possibly as the result of other factors that were not evident at the time of our investigation. Therefore, water level observations at the time of our field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report. Long-term monitoring in observation wells, sealed from the influence of surface water, is often required to more accurately define the potential range of groundwater conditions on a site.

SOIL CORROSIVITY

Corrosion tests were performed to evaluate the soil corrosivity to the buried structures. The tests consisted of minimum resistivity, sulfate content and chloride content, and the results of the tests are included as follows:

Parameter	Results	Test Method
Sulfate	160 ppm	CA 417
Min Resistivity	5,400 ohm-cm	CA 643
Chloride	64 ppm	CA 422
pH Value	6.8	EPA 9045C

INFILTRATION TESTING

Estimated infiltration rates were determined using the results of open borehole percolation testing performed at the subject site. The percolation testing indicated that the near surface fill soils were found to have infiltration rates of approximately 0.21 and 0.31 inch per hour.

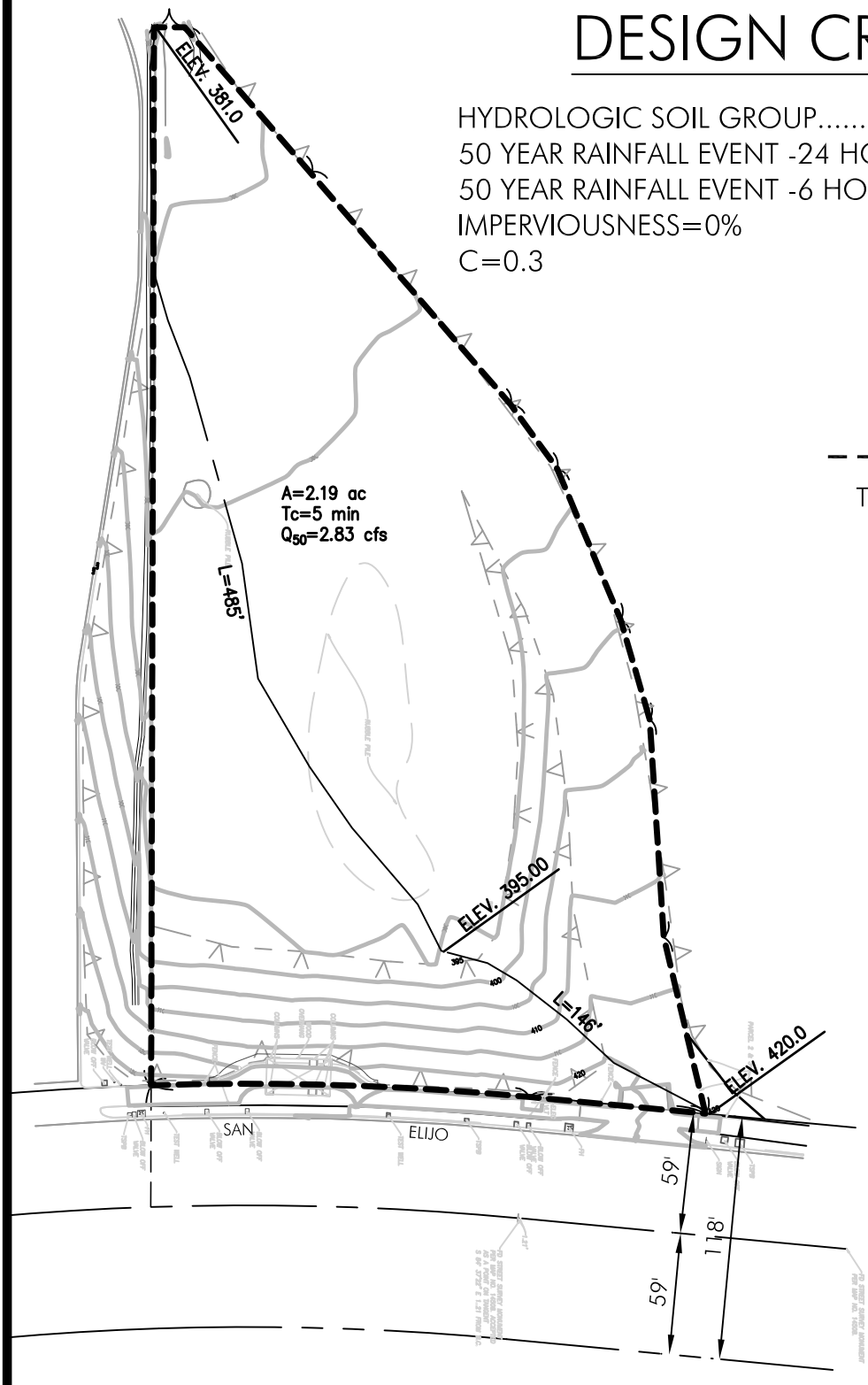
In order to perform the infiltration tests, two borings were drilled to approximately five feet below existing site grades. Infiltration testing was performed at each of the two boring locations. Prior to infiltration testing, approximately four inches of gravel was placed at the bottom of each borehole. The boreholes were pre-soaked prior to testing using clean water. The depth of each borehole was measured at each reading to verify the overall depth. The depth of water in the borehole was measured using a water level indicator or well sounder. Infiltration rates have been calculated using the Inverse Borehole procedures.

Based on the very low infiltration rates, as well as the relatively shallow bedrock soils, the subsurface conditions encountered at the subject site may not be conducive to infiltration. Detailed results of the infiltration testing are included in Appendix A in tabular format.

APPENDIX D (Hydrology Maps)

DESIGN CRITERIA

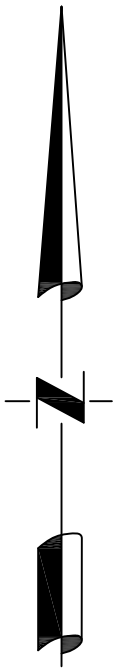
HYDROLOGIC SOIL GROUP.....C
50 YEAR RAINFALL EVENT -24 HOUR.....4.8"
50 YEAR RAINFALL EVENT -6 HOUR.....2.6"
IMPERVIOUSNESS=0%
C=0.3



LEGEND

- - - SUB-AREA BOUNDARIES

T_C TIME OF CONCENTRATION



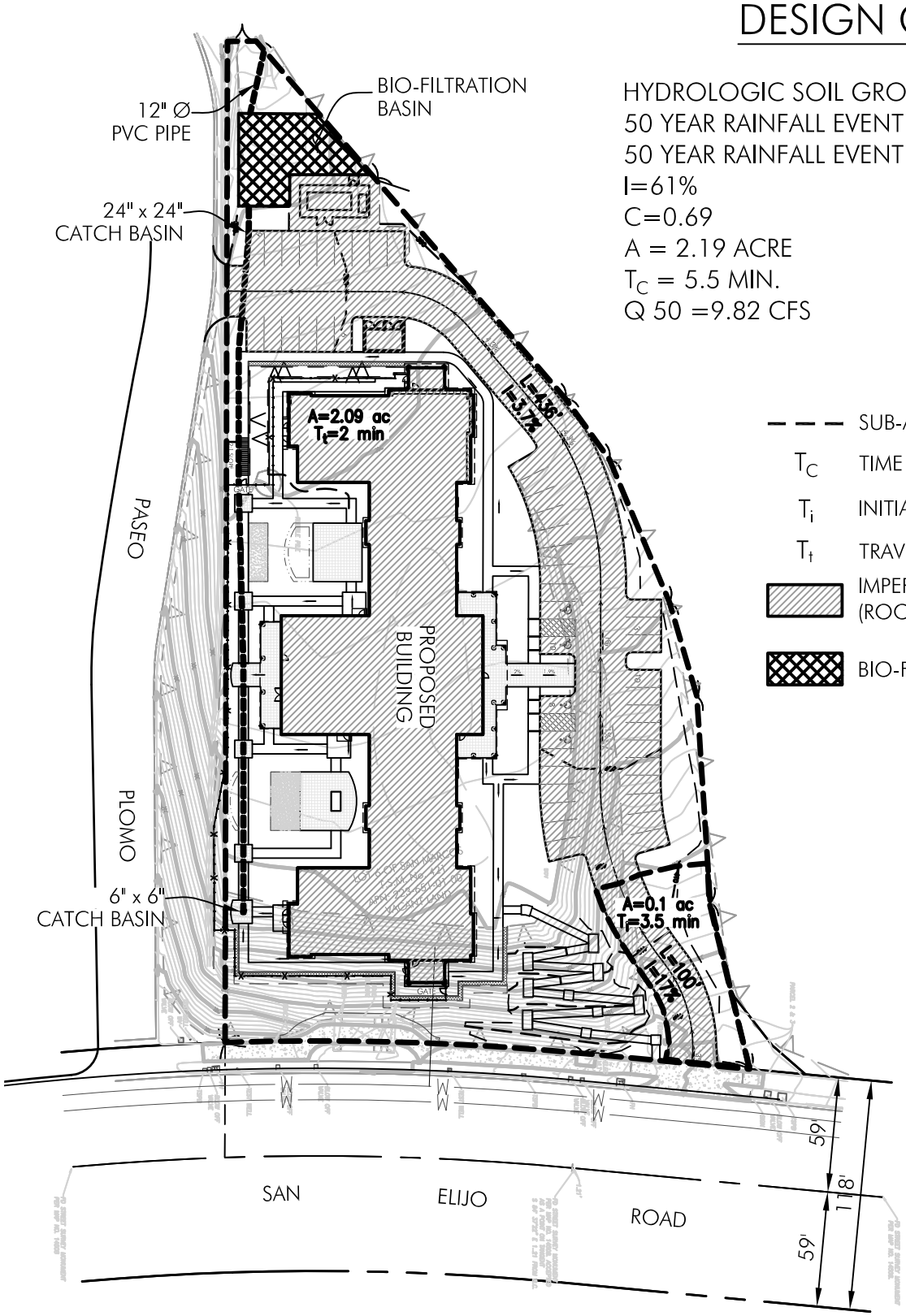
SCALE: 1"=80'

DATE: 05/22/2018

EXISTING CONDITION HYDROLOGY MAP
ARTIS SENIOR LIVING
9 SAN ELIJO RD
SAN MARCOS , CA 92078

DESIGN CRITERIA:

HYDROLOGIC SOIL GROUP.....C
50 YEAR RAINFALL EVENT -24 HOUR.....4.8"
50 YEAR RAINFALL EVENT -6 HOUR.....2.6"
I=61%
C=0.69
A = 2.19 ACRE
T_C = 5.5 MIN.
Q 50 =9.82 CFS



LEGEND

- SUB-AREA BOUNDARIES
- T_C TIME OF CONCENTRATION
- T_i INITIAL TIME OF CONCENTRATION
- T_t TRAVEL TIME
- IMPERVIOUS AREA (ROOF & DRIVEWAY)
- BIO-FILTRATION BASIN

SCALE: 1"=80'

DATE: 05/22/2018

PROPOSED CONDITION HYDROLOGY MAP
ARTIS SENIOR LIVING
9 SAN ELIJO RD
SAN MARCOS , CA 92078