STORM DRAIN REPORT

FOR

12th STREET MINOR USE PERMIT

RAMONA, CALIFORNIA

September 21, 2005

Prepared By:

PARTNERS **Planning and Engineering**
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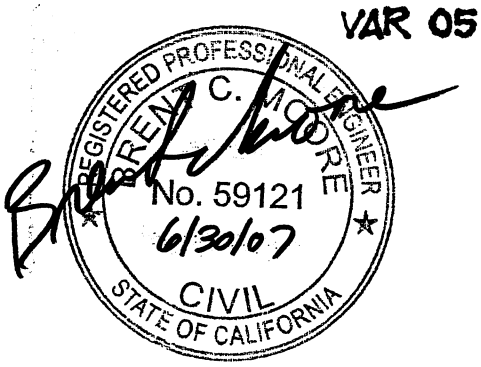

Brent C. Moore., P.E., RCE 59121
Registration Expires 6-30-2007

SDC DPLU RCVD 7/18/06
TPM 20909 RPL

TABLE OF CONTENTS

PROJECT DESCRIPTION	page 1
METHODOLOGY	page 1
EXISTING CONDITIONS	page 1
DEVELOPED CONDITIONS	page 3
EXISTING RUNOFF ANALYSIS	page 3
DEVELOPED RUNOFF ANALYSIS	page 3
RESULTS AND CONCLUSIONS	page 4

LIST OF FIGURES

FIGURE 1: VICINITY MAP	page 2
FIGURE 2A: EXISTING HYDROLOGY MAP	attached
FIGURE 2B: PROPOSED HYDROLOGY MAP	attached
FIGURE 2C: PLATE 10 – "FLOOD AND DRAINAGE MANAGEMENT REPORT FROM THE RAMONA AREA (SDA 8)	attached

LIST OF APPENDICES

Appendix 1: Runoff Coefficients for Urban Areas
Appendix 2: 10-Year and 100-Year Rainfall Isopluvial Maps
Appendix 3: Intensity – Duration Design Chart
Appendix 4: Urban areas Overland Time of Flow Nomograph
Appendix 5: Gutter and Roadway Discharge – Velocity Chart

PROJECT DESCRIPTION:

This storm drain report has been prepared as part of the Discretionary Permit submittal requirements for the proposed lot split occurring at 705 12th Street in the City of Ramona. The east half of the existing site currently consists of a single-family residence with a detached garage as well as a detached storage building. The west half of the lot is currently undeveloped. The site is located east of Interstate 5 and south of S.R. 67 in Ramona, California. See Figure No. 1 for location. See Figures 2A and 2B Existing and Proposed Hydrology Map attached at the end of this report for the on-site drainage basin limits as well as Figure 2C for the overall drainage basin. A Storm Water Management Plan (SWMP) will be prepared as a separate document and included with the plan submittal to address both pre-and post-construction BMPs.

METHODOLOGY:

This drainage report has been prepared in accordance with current County of San Diego regulations and procedures. The Modified Rational Method was used to compute the anticipated runoff for the 10-year and 100-year storms. The following references have been used in preparation of this report:

(1) San Diego County Hydrology Manual, June, 2003
(2) "Flood and Drainage Management Report for the Ramona Area (Special Drainage Area No. 8," June, 1992, prepared by Leedshill-Herkenmoff, Inc.

EXISTING CONDITIONS:

The east half of the existing site currently consists of a single-family residence with a detached garage as well as a detached storage building. The west half of the site is currently undeveloped. The east half of the site is extremely flat with minor, localized ponding occurring in places. Once the localized ponds reach a certain depth (approximately 0.2' to 0.3'), the runoff will flow freely to an existing grated catch basin located near the northeast corner of the site without impacting the existing residence. The finish floor of the existing house is approximately 2 feet in elevation above the grate elevation of the existing catch basin and approximately 1 foot in elevation above the existing grade elevation at the public right-of-way. Therefore, should the existing catch basin become clogged, the runoff would pond to an elevation of approximately 1' above the grate elevation and would sheet flow off-site without impacting the existing residence.

The runoff developed on the west half of the lot sheet flows to the southwest corner of the existing site. The existing masonry block wall located along the westerly portion of the southerly property line as well as the existing wood fence constructed on a masonry block wall along the westerly property line act as a dam to cause the storm water runoff to impound on-site. The block wall essentially creates a 1' dam between the project site and the adjacent property to the west. The impounded runoff eventually percolates into the ground or evaporates into the atmosphere. Should the runoff pond to an elevation of

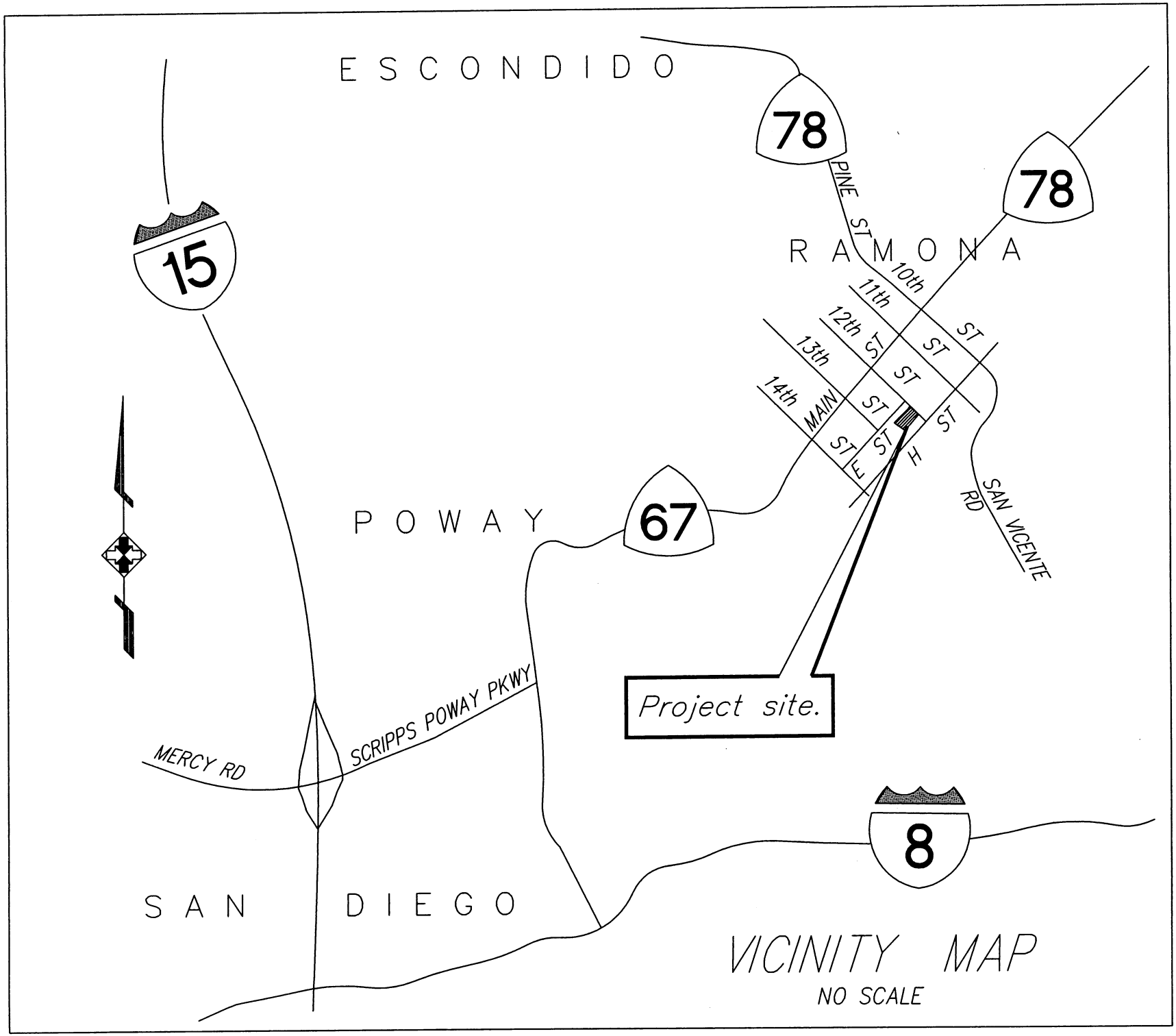
ESCONDIDO
78
78
PINE ST
RAMONA
15
10th ST
11th ST
12th ST
13th ST
14th ST
MAIN ST
E ST
H ST
SAN VICENTE RD
POWAY
67
Project site.
SCRIPPS POWAY PKWY
MERCY RD
8
SAN DIEGO
VICINITY MAP
NO SCALE

FIGURE 1.

approximately 1' above the existing ground, any additional runoff would sheet flow onto the adjacent lot to the west.

DEVELOPED CONDITIONS:

The proposed lot split includes removal of the existing detached storage building, modifications to the existing single-family residence to comply with setback requirements, converting the existing garage into a storage shed, construction of a paved fire access hammerhead turnaround to serve the proposed westerly parcel and precise grading to construct a pad for a future single-family residence on the westerly parcel. The proposed development will not cause a diversion of drainage from the existing condition.

The grades on the east half of the site will essentially remain unchanged with the exception of a driveway addition added to the southerly portion of Parcel 1 to accommodate the proposed tandem parking area. Therefore, the any ponding that occurs on the east half of the site will continue to drain towards either the existing grated catch basin located near the northeast corner of the site or to 12th Street without impacting the existing residence.

The proposed pad for the development of the west side of the property is approximately 1.6' in elevation above the low point located in the southwest corner of the site. As described above, the existing masonry block wall located along the westerly portion of the southerly property line as well as the existing wood fence constructed on a masonry block wall along the westerly property line act as a dam to cause the storm water runoff to impound on-site. The block wall essentially creates a 1' dam between the project site and the adjacent property to the west. Therefore, any localized ponding in excess of 1' would sheet flow towards the existing lot to the west without impacting the proposed pad and future residence.

EXISTING RUNOFF ANALYSIS:

The runoff from the east half of the site drains towards an existing 12" x 12" grated catch basin located near the northeast corner of the site with minor, localized ponding. A runoff coefficient of 0.52 would be appropriate for this basin. The runoff from the westerly half of the site sheet flows to the southwest corner of the site where it ponds due to some existing site constraints. A runoff coefficient of 0.35 would be appropriate for this basin.

DEVELOPED RUNOFF ANALYSIS:

The proposed, developed condition does not cause a diversion of drainage when compared to the existing condition. The runoff coefficients for the site were based on soil group D and the ultimate improvements for the proposed site. A runoff coefficient of 0.61 and 0.63 would be appropriate for the east half and the west half of the site

respectively. The runoff coefficients were weighted due to the amount of impervious area on the proposed site.

RESULTS AND CONCLUSIONS:

For both the existing and developed conditions, the easterly basin is approximately 9,110 SF (0.21 AC) and the westerly basin is approximately 8,910 SF (0.20 AC). The existing site generates 0.2 cfs and 0.25 cfs of runoff within the east half of the site (towards the existing grated catch basin located at the northeast corner of the site) and 0.2 cfs and 0.34 cfs of runoff within the west half of the site (towards the southwest corner of the site) during the 10-year and 100-year storms respectively. The proposed, developed condition generates 0.3 cfs and 0.45 cfs of runoff within the east half of the site (towards the existing grated catch basin located at the northeast corner of the site) and 0.4 cfs and 0.6 cfs of runoff within the west half of the site (towards the southwest corner of the site) during the 10-year and 100-year storms respectively. The increase in runoff on the west half of the site (0.2 cfs to 0.3 cfs) should not adversely impact the downstream property owner(s) nor the downstream natural channel due to the impound condition generated by the existing site walls and fences. The increase in storm water runoff from the east half of the site (0.1 cfs to 0.2 cfs) should not adversely impact the downstream property owner(s) nor the downstream natural channel. The reason for this is due to flood routing as allowed by the Modified Rational Method. The time of concentration for the overall basin contributing storm water runoff to the existing channel located northerly of the project site will be much longer that the localized time of concentration for the on-site basin. To obtain the peak flow in the existing channel, the developed runoff generated on-site will be corrected by a ratio of the overall basin intensity versus the on-site intensity as allowed by the Modified Rational Method. The intensity ratio will reduce the minor increase in flow generated on-site to the point where the increase will not adversely impact the downstream channel.

The grades on the east half of the site will essentially remain unchanged with the exception of a driveway addition added to the southerly portion of Parcel 1 to accommodate the proposed tandem parking area. Therefore, the any ponding that occurs on the east half of the site will continue to drain towards either the existing grated catch basin located near the northeast corner of the site or to 12th Street without impacting the existing residence.

The proposed pad for the development of the west side of the property is approximately 1.6' in elevation above the low point located in the southwest corner of the site. As described above, the existing masonry block wall located along the westerly portion of the southerly property line as well as the existing wood fence constructed on a masonry block wall along the westerly property line act as a dam to cause the storm water runoff to impound on-site. The block wall essentially creates a 1' dam between the project site and the adjacent property to the west. Therefore, any localized ponding in excess of 1' would sheet flow towards the existing lot to the west without impacting the proposed pad and future residence.

See the attached calculations for the 10-year and 100-year storm events.

As shown in the "Summary of Existing Conditions and Recommended Improvements" section of the "Flood and Drainage Management Report for the Ramona Area (Special Drainage Area No. 8), dated June, 1992, prepared by Leedshill-Herkenmoff, Inc, the overall runoff generated during the 100-year storm within the existing channel located northerly of the project site was calculated to be 424 cfs.

100 & 10-YEAR CALCULATIONS
EXISTING CONDITION

BASIN E1 (Drains To Back of LOT)
A = 8960 SF (0.20 AC)
C = 0.35
L = 170'
ΔH = 1.1' > Save = 0.65%

Urban Overland Flow

$$T_c = \frac{1.8(1.1-C)\sqrt{D}}{\sqrt[3]{S}} \simeq \frac{1.8(1.1-0.35)\sqrt{170'}}{\sqrt[3]{0.65}} \simeq 20.3 \text{ Minutes}$$

$$I_{10} \simeq 7.44\,(2.4)\,(20.3)^{-0.645} \simeq 2.56 \text{ IN/HR}$$

$$I_{100} \simeq 7.44\,(3.4)\,(20.3)^{-0.645} \simeq 3.63 \text{ IN/HR}$$

$$Q = CIA = (0.35)(I)(0.20\,AC)$$

$Q_{10} = 0.2$ cfs w/ T_c = 20.3 Minutes
$Q_{100} \simeq 0.25$ cfs w/ T_c = 20.3 Minutes

BASIN E2 (Drains Towards front of LOT)

$A = 9110$ SF (0.21 Ac)

$C = 0.52$

$L = 180'$

$\Delta H \simeq 0.3' > S_{ave} \simeq 0.17\%$

Urban Overland flow

$$T_c = \frac{1.8(1.1-C)\sqrt{D}}{\sqrt[3]{S}} \simeq \frac{1.8(1.1-0.52)\sqrt{180}}{\sqrt[3]{0.17}} \simeq 25.3 \text{ minutes}$$

$$I_{10} = 7.44(2.4)(25.3)^{-0.645} \simeq 2.22 \text{ IN/HR}$$

$$I_{100} \simeq 7.44(3.4)(25.3)^{-0.645} \simeq 3.15 \text{ IN/HR}$$

$$Q = CIA = (0.52)(I)(0.21 \text{ Ac})$$

$Q_{10} \simeq 0.2$ cfs w/ $T_c = 25.3$ minutes

$Q_{100} \simeq 0.34$ cfs w/ $T_c = 25.3$ minutes

12th ST MINOR USE PERMIT
Hydrology Calcs
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100 & 10-year calcs
Developed Condition

BASIN D1 (ASSUME FUTURE HOUSE, DRAINS TO BACK of LOT)

A = 8910 SF (0.20 Ac)
ASSUME FUTURE SINGLE FAMILY HOUSE (% Imp ≈ 50%)
C = 0.9 (0.50) + 0.35 (0.50) = 0.63
L = 170' > Save ≈ 0.65%
ΔH = 1.1'

Urban Overland Flow

$$T_c = \frac{1.8(1.1-C)\sqrt{D}}{\sqrt[3]{S}} \approx \frac{1.8(1.1-0.63)\sqrt{170'}}{\sqrt[3]{0.65}} \approx 12.7 \text{ minutes}$$

$$I_{10} = 7.44(2.4)(12.7)^{-0.645} \approx 3.47 \text{ in/hr}$$

$$I_{100} \approx 7.44(3.4)(12.7)^{-0.645} \approx 4.91 \text{ in/hr}$$

$$Q = CIA = (0.63)(I)(0.20 Ac)$$

$Q_{10} \approx 0.4$ CFS w/ Tc = 12.7 minutes
$Q_{100} \approx 0.6$ CFS w/ Tc = 12.7 minutes

BASIN D2 (DRAINS TOWARDS FRONT OF LOT)

A = 9110 sf (0.21 Ac)
Impervious Area ≃ 4300 sf ⇒ % Imp ≃ 47%
C = 0.9(0.47) + 0.35(0.53) ≃ 0.61
L = 180' > Save ≃ 0.17%
ΔH ≃ 0.3'

Urban Overland Flow

$$T_c = \frac{1.8(1.1-C)\sqrt{D}}{\sqrt[3]{S}} \simeq \frac{1.8(1.1-0.61)\sqrt{180}}{\sqrt[3]{0.17}} \simeq 21.4 \text{ minutes}$$

$$I_{10} \simeq 7.44(2.4)(21.4)^{-0.645} \simeq 2.48 \text{ in/HR}$$

$$I_{100} \simeq 7.44(3.4)(21.4)^{-0.645} \simeq 3.51 \text{ in/HR}$$

$$Q = CIA = (0.61)(I)(0.21 \text{ Ac})$$

$Q_{10} \simeq 0.3$ cfs w/ $T_c = 21.4$ minutes

$Q_{100} \simeq 0.45$ cfs w/ $T_c = 21.4$ minutes

The recommended improvements shown in this table are for the purpose of providing a basic design for cost estimating. Environmental review and final design will be necessary before any improvements can be constructed.

SUMMARY OF EXISTING CONDITIONS AND RECOMMENDED IMPROVEMENTS

Basin No.	Facility No.	Plate No.	Location	Drainage Area (SQ MI)	Length (FT)	Existing Conditions	Capacity CFS Existing	Capacity CFS Required 1992 50 YR	Capacity CFS Required 1992 100 YR	Associated Problems	Recommended Improvements	Installation Cost (Dollars)	Priority
10	4	10	Crosses 16th St. at Arlene Way	0.73	30	6' x 4' RCB			522	Overtops Road	40' Wide Single Span Bridge, with Conc. Trap Channel b = 12' d = 5' Inv Out 1407.53 Inv In 1407.73	$120,000	4
10	5	10	East of Sixteenth St. South of Arlene Way	0.73	732	Natural Drainage			507	Flooding of Possible Future Development	Conc. Trap Channel b = 12' d = 5' Inv Out 1407.73 Inv In 1410.55	$359,700	2
10	6	10	North of "H" St. West of Fourteenth St.	0.63	492	Double 7.2' x 4' RCB			441	Flooding of Existing Development	14' x 6' RCB Inv Out 1410.55 Inv In 1411.58	$666,000	1
10	7	10	Crosses 14th St. at H St	0.63	1,062	Natural Drainage			441	Flooding Of Existing And Future Development	Conc. Trap Channel with 1' Dike b = 20' d = 5' Inv Out 1411.58 Inv In 1413.80	$687,600	1
10	8	10	South of Twelfth St. at "E" St.	0.60	640	Double 66" CMP Asphalt Dipped			424	Flooding of Existing Development	Double 6' x 4' with Improved Inlet Inv Out 1413.80 Inv In 1418.14	$577,500	1

12th ST
Hydrology Calcs
5 of 5

APPENDIX

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

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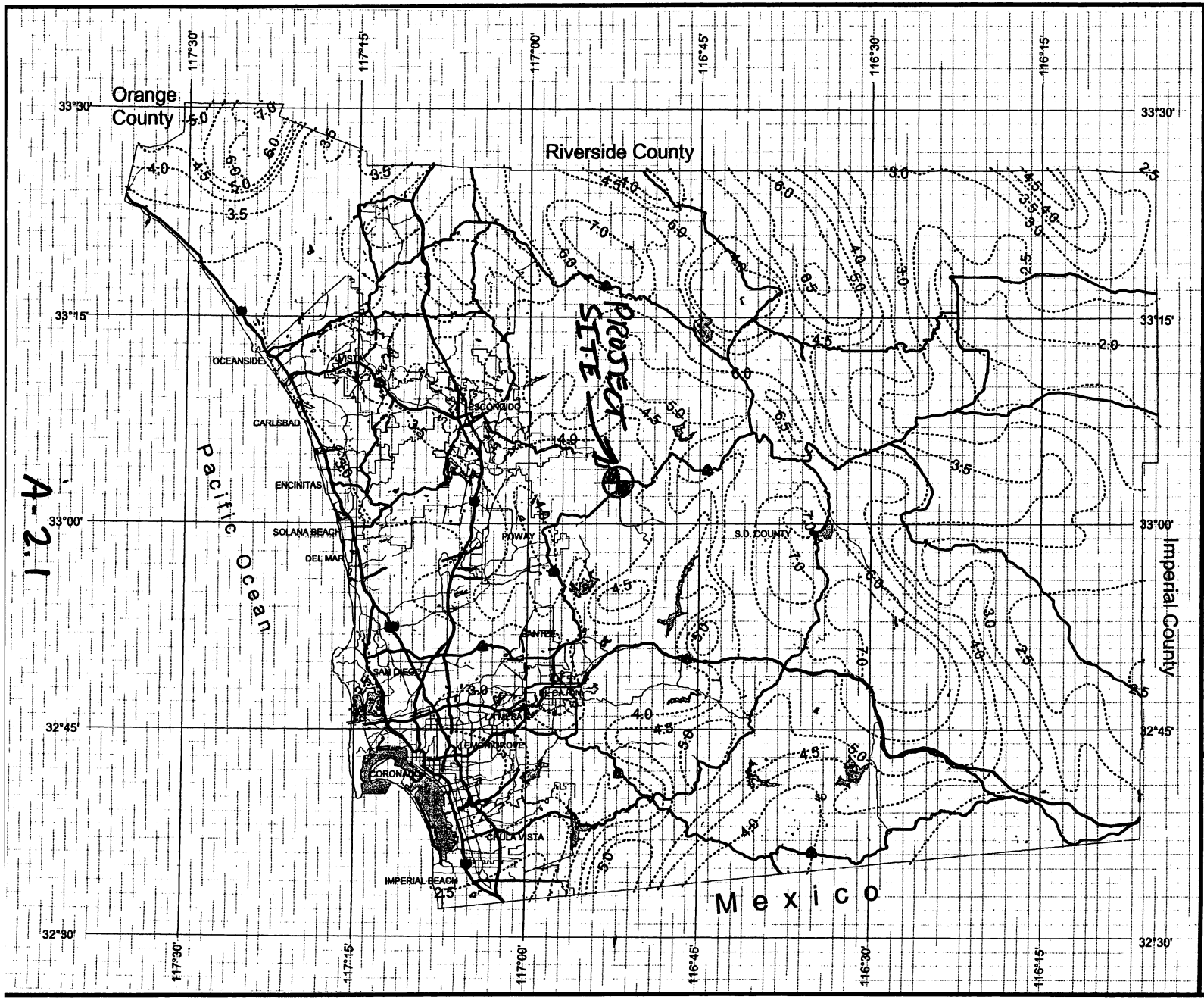

County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours

Isopluvial (inches)

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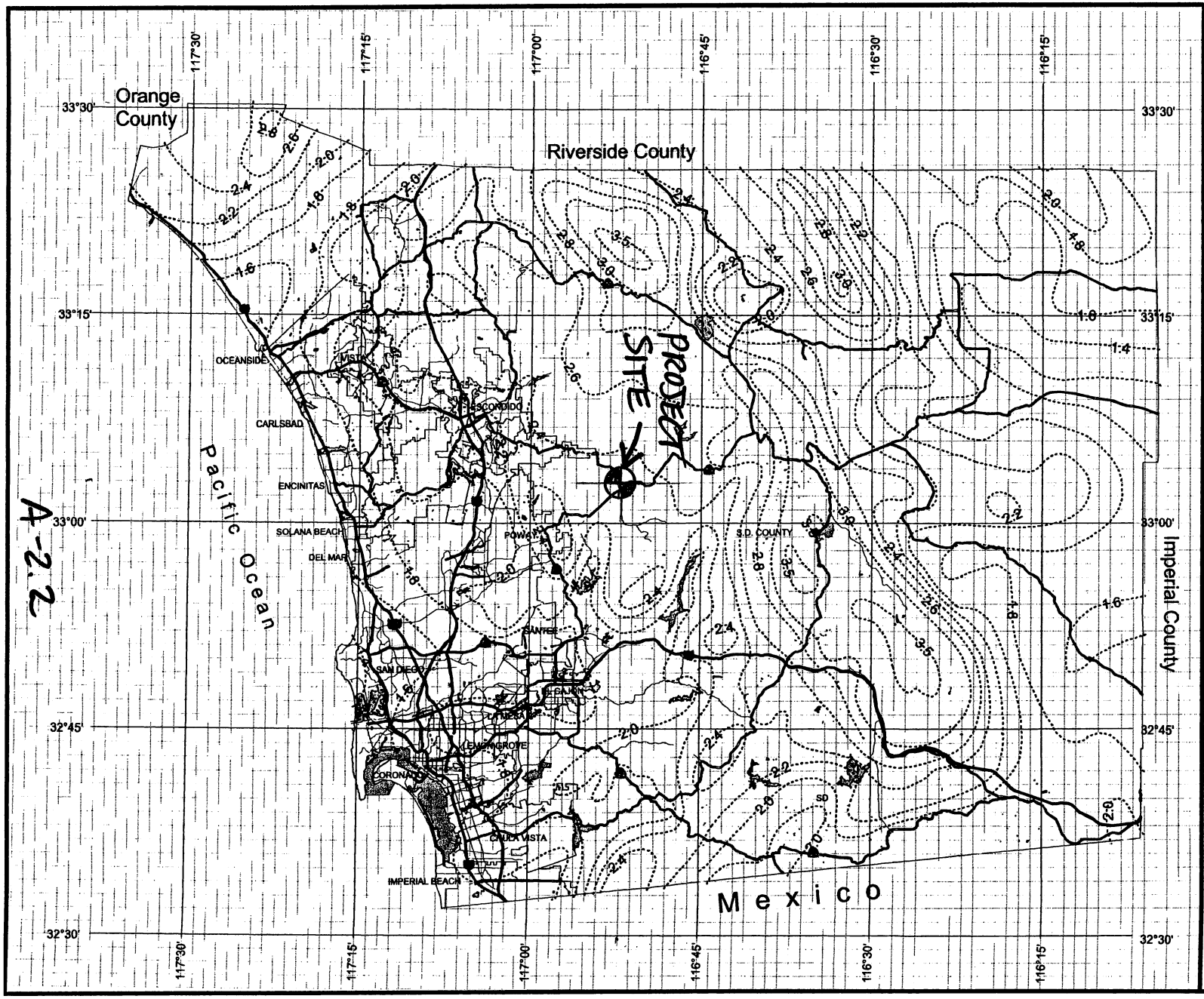
County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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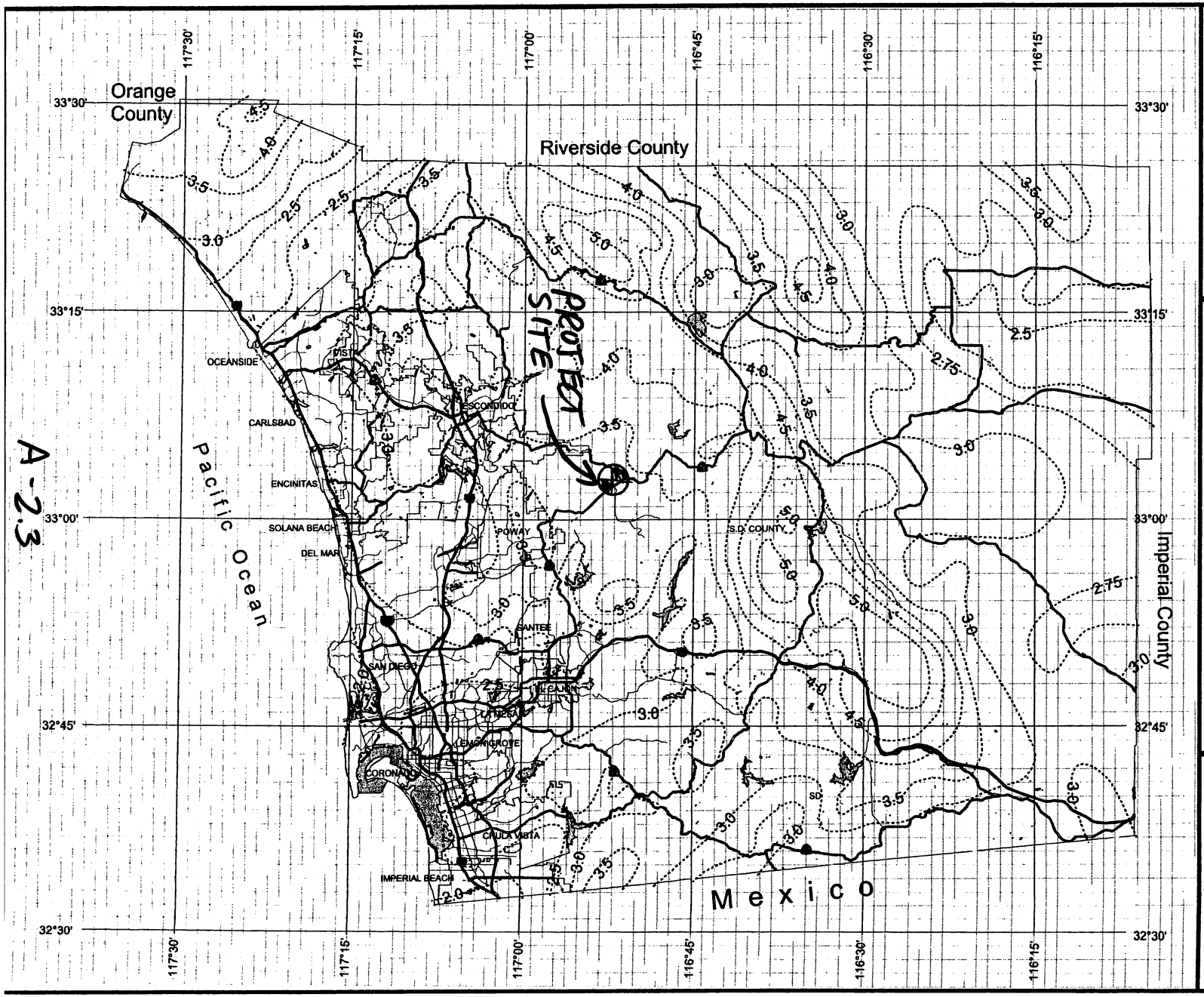
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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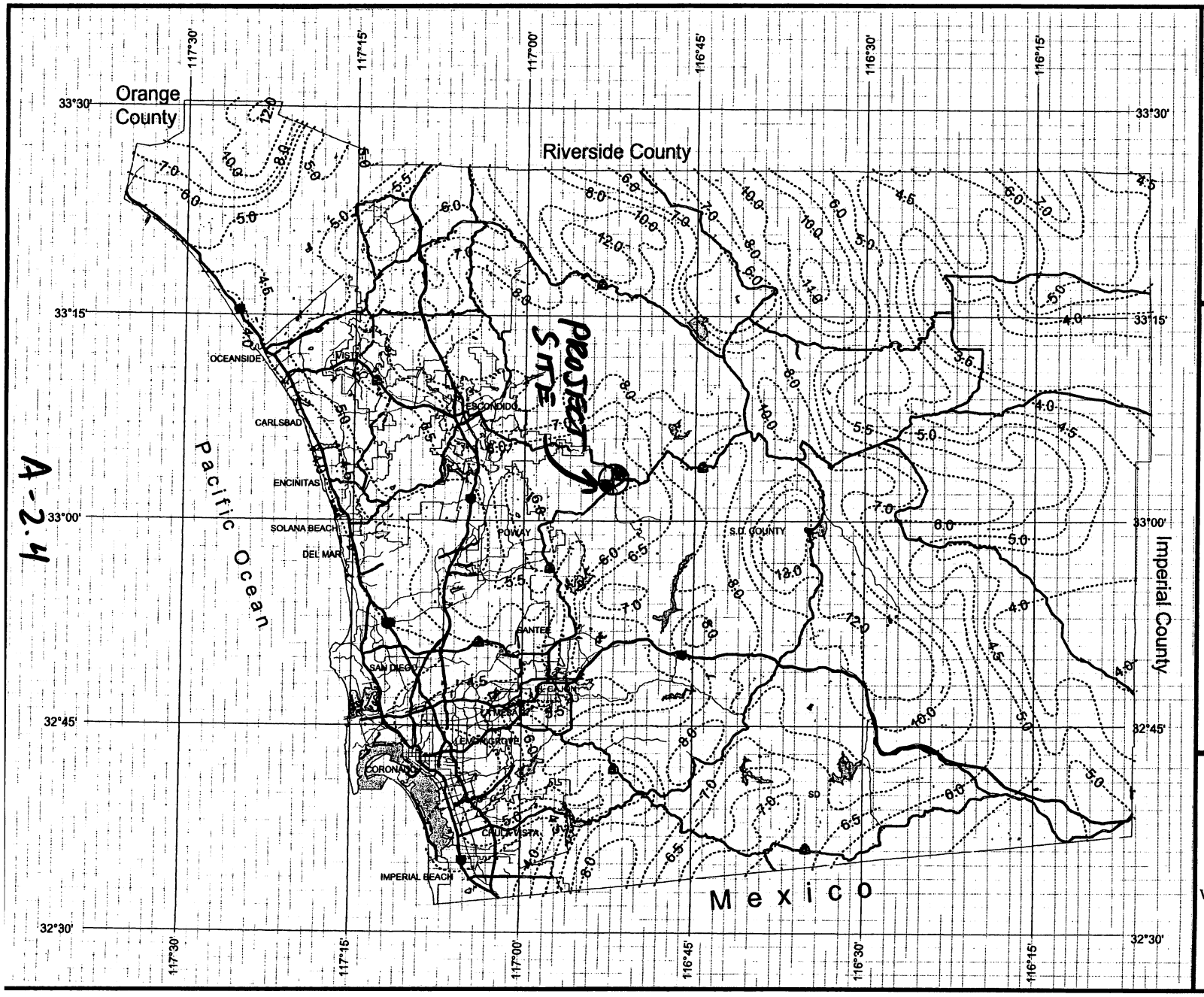

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

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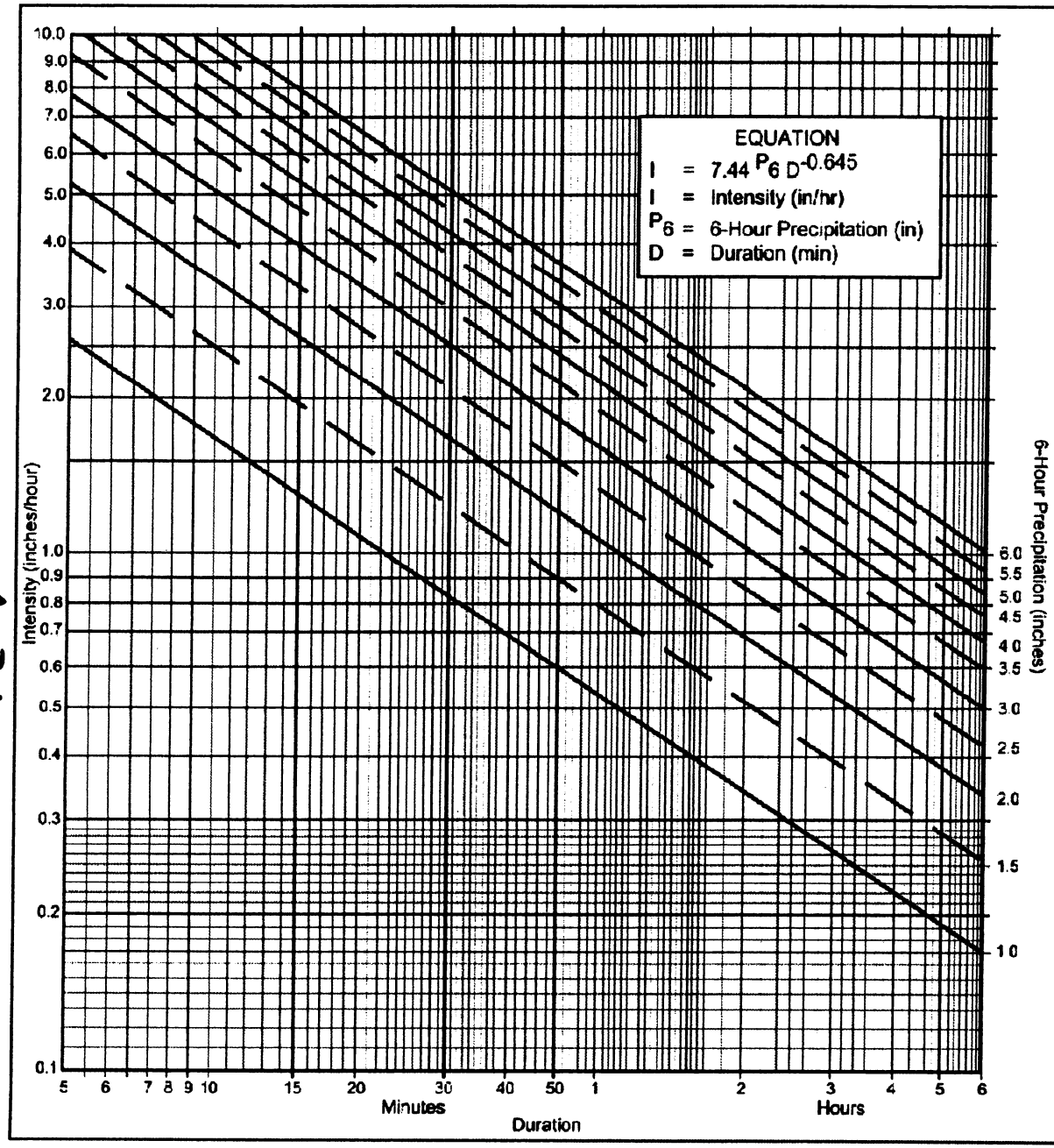


Directions for Application:

(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 = 2.4 in., P_{24} = 4.0 $\frac{P_6}{P_{24}}$ = 60 %(2)

(c) Adjusted P_6(2) = 2.4 in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

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

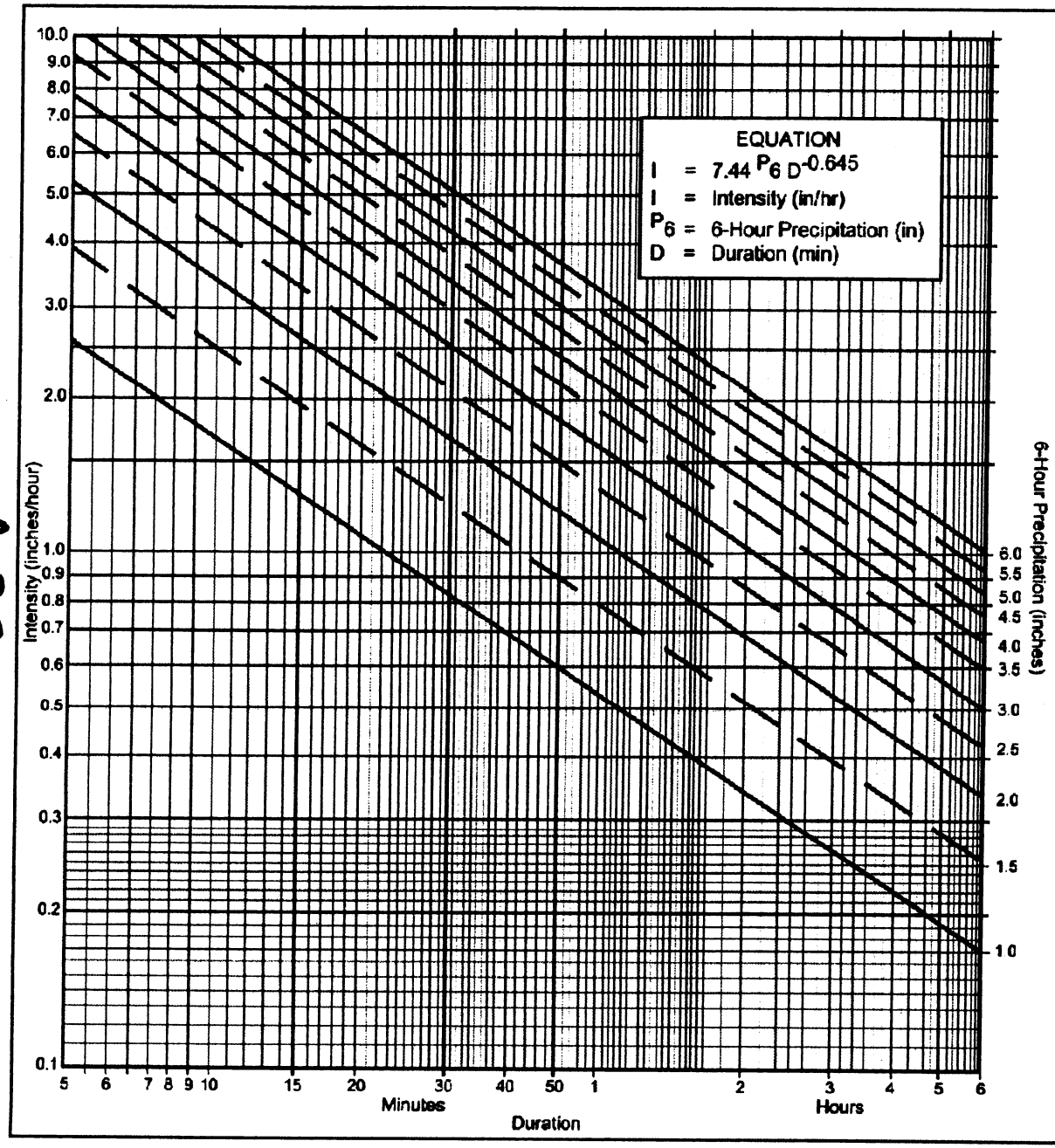
P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.06	1.62	2.15	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

A-3.1



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

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.4 in., P_{24} = 5.9, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 3.41 in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

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

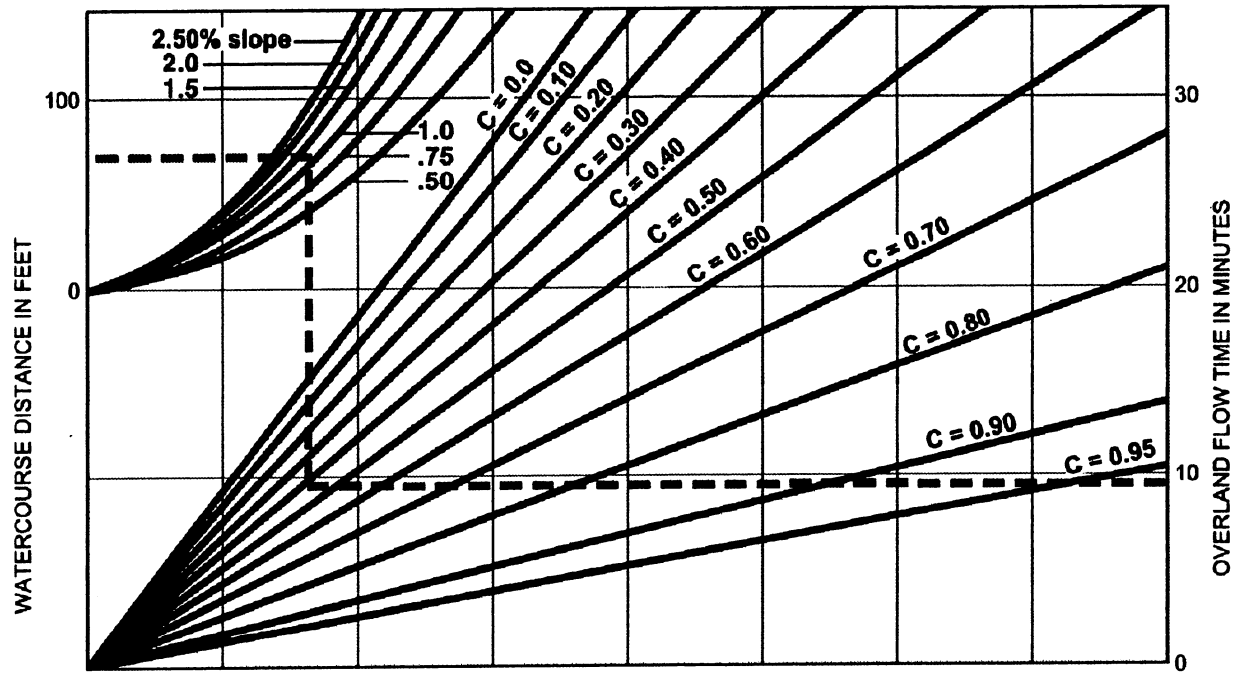
P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	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

A-3.2



EXAMPLE:

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

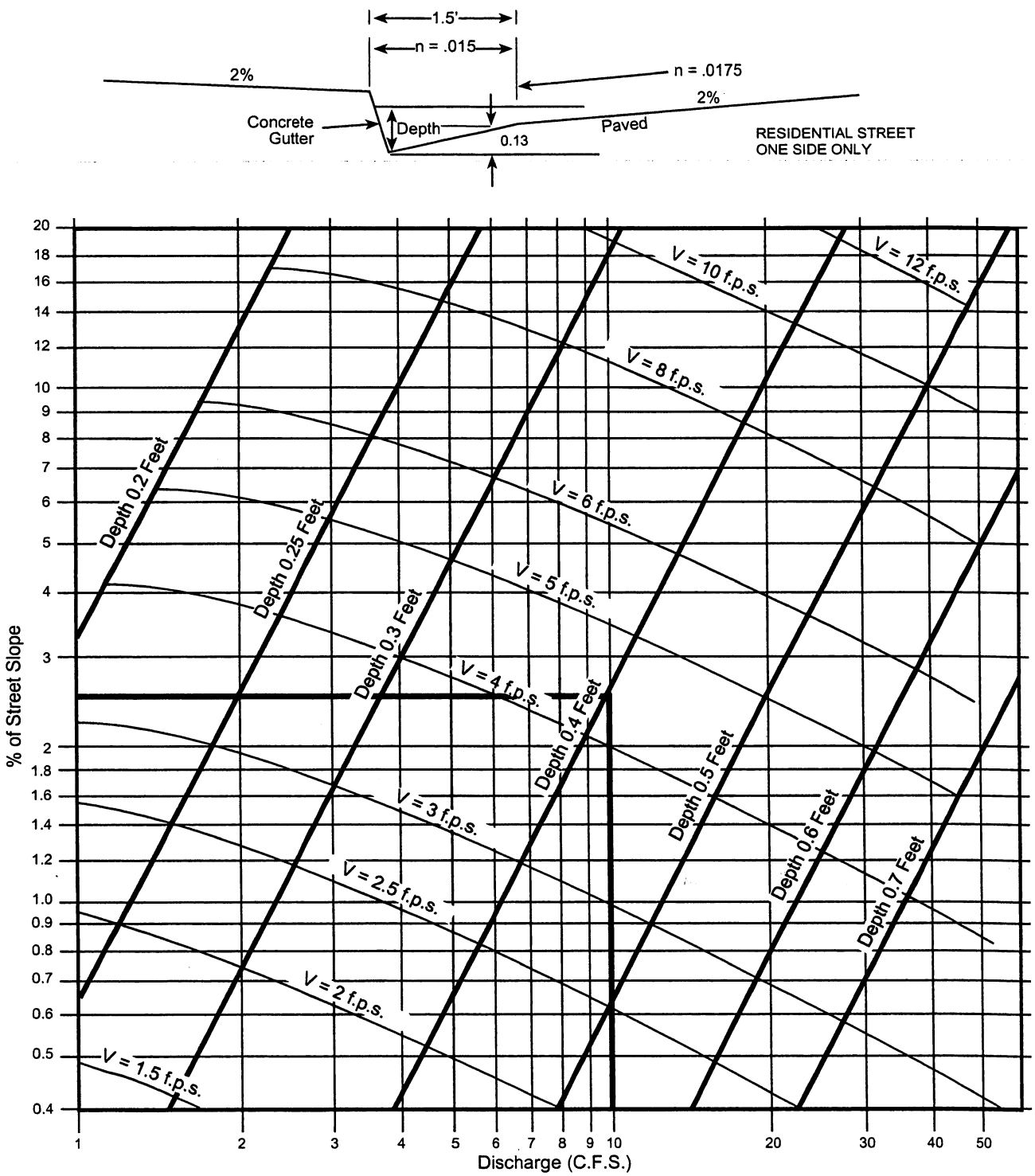
$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

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.

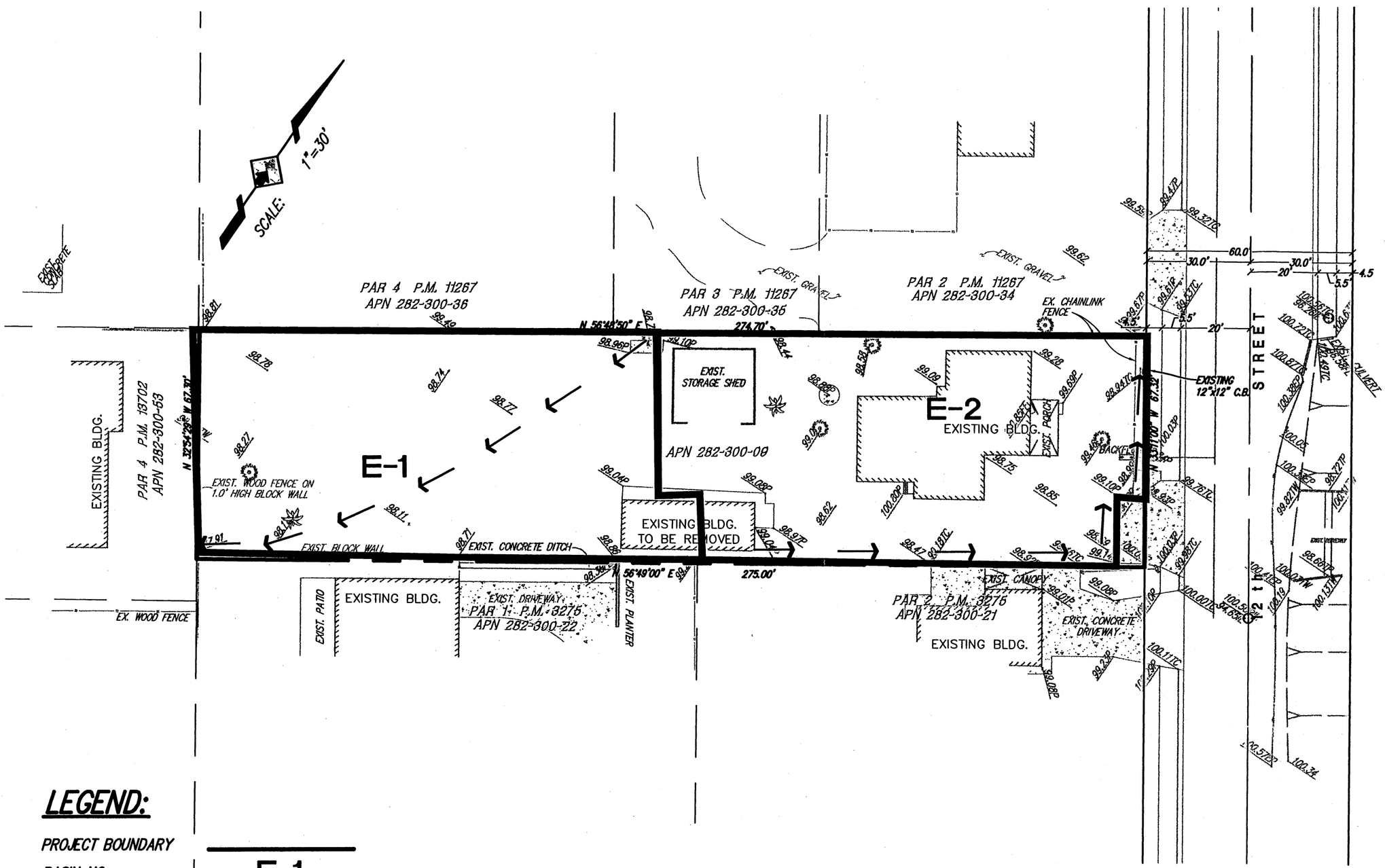
SOURCE: San Diego County Department of Special District Services Design Manual

FIGURE

Gutter and Roadway Discharge - Velocity Chart

3-6

A-5



LEGEND:

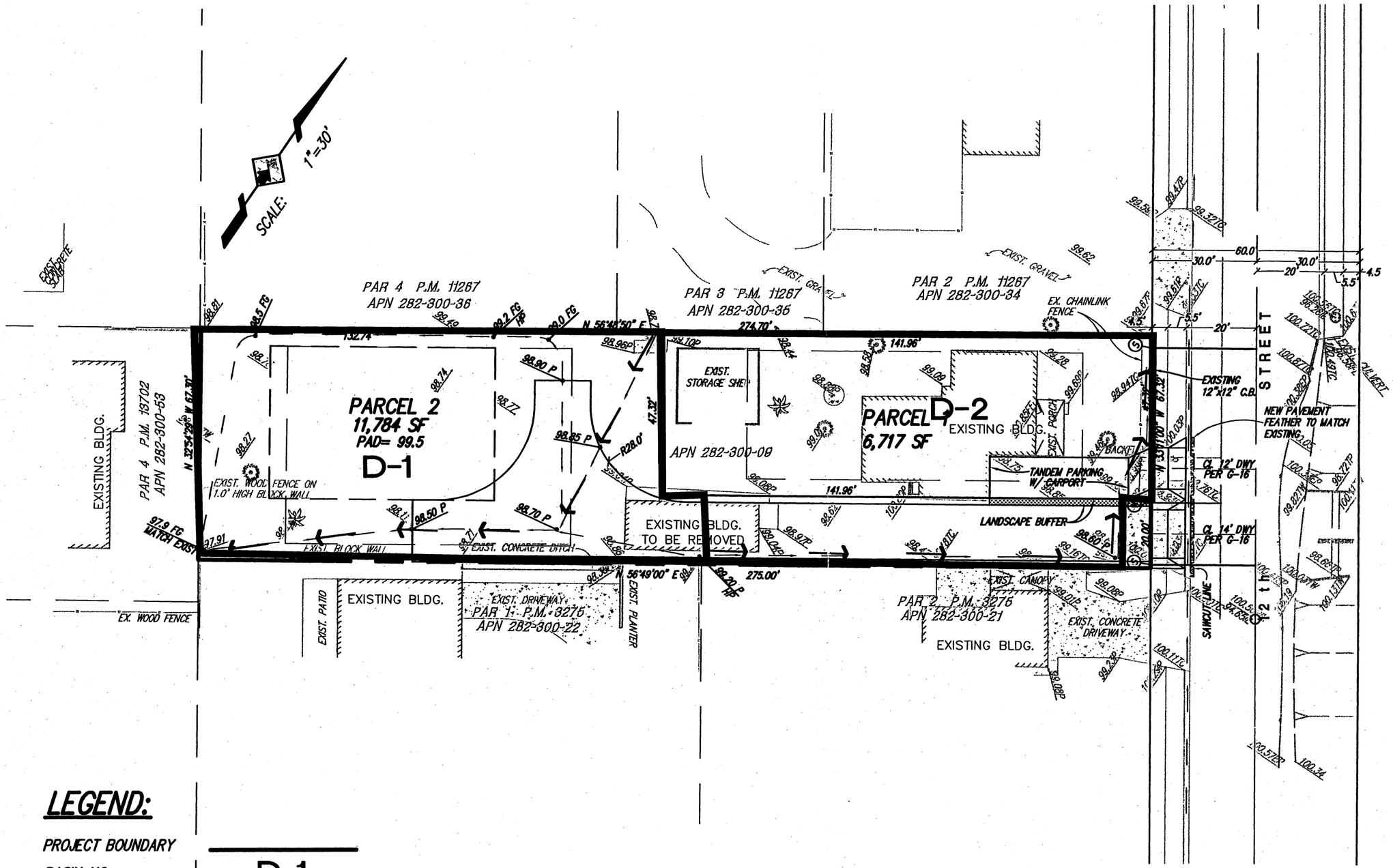
PROJECT BOUNDARY	
BASIN NO.	E-1
BASIN LIMIT	
DIRECTION OF FLOW	→ → →

EXISTING HYDROLOGY EXHIBIT

705 12TH STREET RAMONA

PARTNERS
Planning and Engineering
15938 Bernardo Center Drive
San Diego, CA. 92127
Ph. (858) 376-3444
Fax: (858) 376-3555

FIGURE: 2A



LEGEND:

PROJECT BOUNDARY

BASIN NO. D-1

BASIN LIMIT

DIRECTION OF FLOW

DEVELOPED HYDROLOGY EXHIBIT

705 12TH STREET RAMONA

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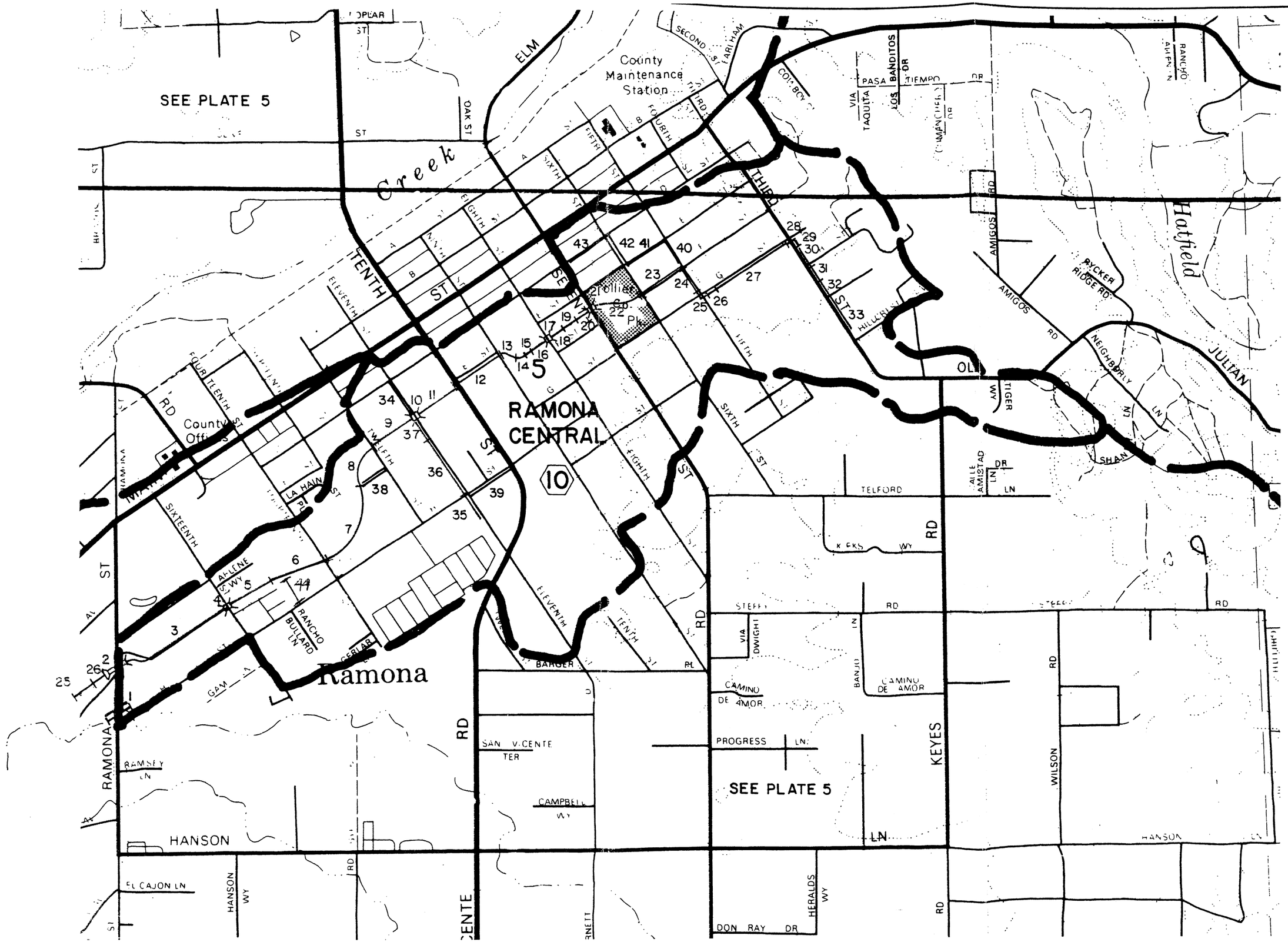

SCALE
1" = 1000'
DATE

LEEDSHILL-HERKENHOFF, INC.
10225 BARNES CANYON ROAD
SUITE A210

RECOMMENDED FLOOD CONTROL & DRAINAGE PLAN
SDA 8

PLATE
10