DRAINAGE STUDY

TPM 20985 RPL

LOG NO. ER 05-01-006

INTERSECTION SAN JACINTO CIRCLE
AND BRIANA COURT

FALLBROOK, CA 92028

PREPARED BY:

Hadley Johnson
William Karn Surveying, Inc.
129 W. Fig Street
Fallbrook, CA 92028
760-728-1134

PREPARED FOR:

County of San Diego

DATE: NOVEMBER 8, 2006
Revised 3/5/07

REGISTERED PROFESSIONAL ENGINEER
HADLEY JOHNSON
NO. 14870
Exp. 3-31-07
CIVIL
STATE OF CALIFORNIA

3/5/07

TPM 20985
DRAINAGE – HYDROLOGY STUDY
LOG NO. ER 05-01-006
APN 121-230-39

TPM 20985 has two very small drainage areas (1) along Briana Court Road (1.2 +/- acs) and (2) above the proposed pad for Parcel NO. 1 (2.0 +/- acs). A third drainage area enters the property form the east also a small area (3.5 +/-) is not impacted by the proposed project.

Drainage area (1) has a watershed length of 500 ft. and an elevation difference of 75 ft. The drainage concentrate at the end of the driveway near the west property line and continue in the natural swale.

Drainage area (2) above the proposed pad has a watershed length of 440 ft. and an elevation difference of 100 ft. The drainage is intercepted by brow ditch and carried around the proposed pad. The drainage concentrate at rip rap near the east side of the pad and continues past the proposed leach lines in a concrete lined swale to the natural swale.

The rational method was used to analyze the 100 year flow event. Utilizing the rational method, the existing and proposed flows volume from the two drainage area analyzed are tabulated below:

Drainage Area		Pre Construction								Post Construction						
Area		C	H	L	Tc	I100	Q100	V100	Area	C	H	L	Tc	I100	Q100	V100
1	1.2+/-	0.32	75'	500'	8.4	6 in/hr	2.3 cfs	3.4 ft/sec	1.2+/-	0.4	75'	500'	8.4	6.0	2.9 cfs	4.4 ft/sec.
2	2+/-	0.32	100'	440'	7.4	7 in/hr	4.5 cfs	6.1 ft/sec	2.0	0.35	100'	440'	7.4	7.0	4.9 cfs	6.3 ft/sec.
2&3	5.5	0.32	64	600	9	5.5	9.7 cfs	2.6 ft/sec	5.5	0.327	64	600	9	5.5	9.9 cfs	2.7 ft/sec.

The increase flow of 0.6 cfs and 0.4 cfs will be mitigated by the bio filters and the velocity will be reduced by the rip rap.

3. The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on-or off-site. The drainage areas are very small 1,2 ac & 2 acs and bio filter and rock rip rap are used to reduce velocity and erosion and siltation on and off site. Velocities are low and therefore no erosion.

4. The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-or offsite. The increase in flows are very minor 1.1 cfs and 0.3 cfs which would not cause flooding on or offsite.

5. The proposed project would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems. Calculations show the brow ditches capacity exceed 100 year flows.

6. The proposed project would not place housing within a 100 year flood hazard area as mapped on a federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map, including county floodplain maps. Drainage areas are small and are not within a flood hazard area.

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT. THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONALS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY, AND DOES NOT RELIEVE ME, AS AN ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

HADLEY JOHNSON
R.C.E. 14870

DATE: MARCH 5, 2007

REGISTERED PROFESSIONAL ENGINEER
HADLEY JOHNSON
No. 14870
EXP. 3-31-09
CIVIL
STATE OF CALIFORNIA

DRAINAGE ANALYSIS
TPM 20985
APN 121-230-39
PARCEL 1, PM 17818

Drainage Area along driveway Area No. 1

1.2 acs.

Soil Group
B

Average C = 0.32

$Q_{85} = 0.32(1.8)(1.2)$

$Q_{85} = 0.7$ cfs

$Q_{100} = 0.32(6)(1.2)$

$Q_{100} = 2.3$ cfs

Capacity driveway exceeds 2.6 cfs . . OK

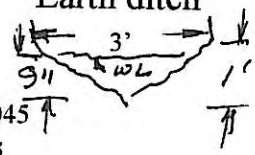
Watershed L = 500'
Watershed H = 75'
S = 15%

Tc = 1.6 + 6.4 = 8.0 mins.

$I_{85} = 1.8$ in/hr

$I_{100} = 6$ in/hr

Earth ditch



assume n = 0.045
Grass & weeds
a = 0.844 $r = \frac{0.844}{2.70} = 0.31$

wp = 2.70 $r^{2/3} = 0.46$

$Q = \frac{1.486}{0.045}(0.844)(0.46)(0.224)$

Q = 2.87 V = 3.4 ft/sec.

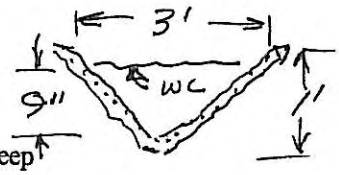
Flow from pad & above Area No 2.

Soil Group B

Watershed L = 440'
Watershed H = 100'
S = 23%

n = 0.025

concrete ditch 9" deep



Use C = 0.32

Tc = 1 + 6.4 = 7.4 mins. a = 0.844
Wp = 2.70

Pre Construction

$Q_{85} = 0.32(2.1)(2)$

$Q_{85} = 1.3$ cfs

$Q_{100} = 0.32(7.0)(2.0)$

$Q_{100} = 4.5$ cfs

Capacity Swale exceeds 5 cfs ∴ OK

$I_{85} = 2.1$ in/hr

$I_{100} = 7.0$ in/hr

$r = \frac{0.844}{2.70} = 0.31$ r 2/3 = 0.46

concrete swale
S = 5%
S ½ = 0.224

$Q = \frac{1.486}{n}$ a r 2/3 S ½

$Q = \frac{1.486}{0.025}$ 0.844 (0.46)(0.224)

Q = 5.1 cfs V = 6.1 ft/sec.

Post Construction
AREA NO. 1
Approximate 0.2 acs will be paved driveway

The revised C will be

$$CR = \frac{0.2 \text{ acs } (0.80) + 1.0\ (0.32)}{1.2} = 0.4$$

Q85 = 0.4(1.8)(1.2)
Q85 = 0.86 cfs

Q100 = 0.4(6.0)(1.2)
Q100 = 2.9 cfs

Increase flow
Q85 = 0.4 cfs
Q100 = 1.1 cfs

AREA NO. 2

Pad Area & Above
Approximately 0.1 acs will be roof

The Revised C will be:

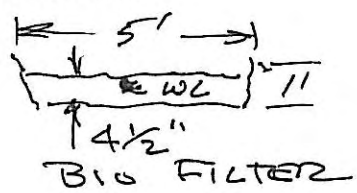
$$CR = 0.1\frac{(0.80) + 1.9(0.32)}{2.0} = 0.35$$

Q85 = 0.35(2.1)(2)
Q85 = 1.5 cfs

Q100 = 0.35(7.0)(2)
Q100 = 4.9 cfs

Increase flow will be mitigated by grass lined swale

Capacity grass swale 5 ft. wide 50 ft long
Assume water depth 4 ½"



Slope = 2% S ½ = 0.1414 Grass lined maintained
a = 1.88 sq. ft. n = 0.035
wp = 5.75 $r = \frac{1.88}{5.75} = 0.33$ r 2/3 = 0.474

$$Q = \frac{1.486}{0.035}(1.88)(0.47)(0.1414)$$

Q = 5.3 cfs exceed 4.9 cfs ∴ OK
V = 2.8 ft/sec.

AREA NO. 3 = 3.5 acs

Combine Area 2 & 3 = 5.5 acs

Pre Construction

Area = 5.5 acres

Watershed L = 600 ft.
Watershed H = 594 – 530 = 64

C = 0.32

Tc = 2.6 + 6.4 = 9

Q_{85} = 0.32(1.5)(5.5)
Q_{85} = 2.64 cfs

I_{85} = 1.5 in/hr
I_{100} = 5.5 in/hr

Q_{100} = 0.32(5.5)(5.5)

Q_{100} = 9.7 cfs

Post Construction

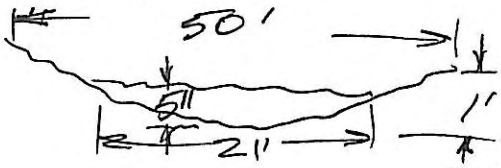
$$CR = \frac{0.1\ acs(0.80) + 5.4acs(0.32)}{5.5}$$

Cr = 0.327

Q85 = 0.327(1.5)(5.5)
Q85 = 2.7 cfs

Q100 = 0.327(5.5)(5.5)
Q100 = 9.9 cfs

Capacity swale @ PL



S=0.024

a = 4.38 sq. ft.
S = 5% n = 0.045 wp = 21
$r = \frac{4.38}{21} = 0.21$

r 2/3 = 0.35

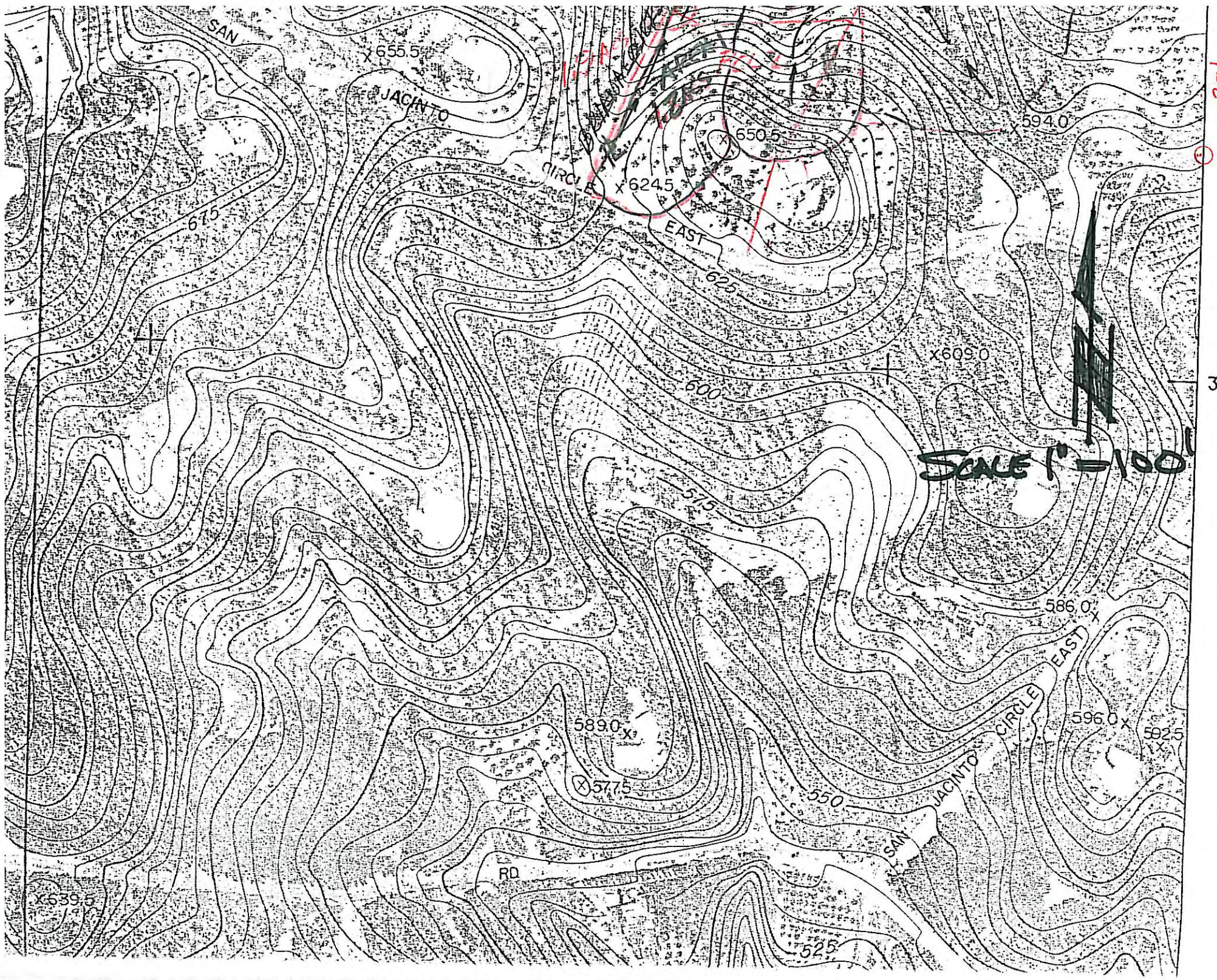
$Q = \frac{1.486}{n}$ ar 2/3 S ½

$Q = \frac{1.486}{n=0.045}$ 4.38(0.35)(0.224)

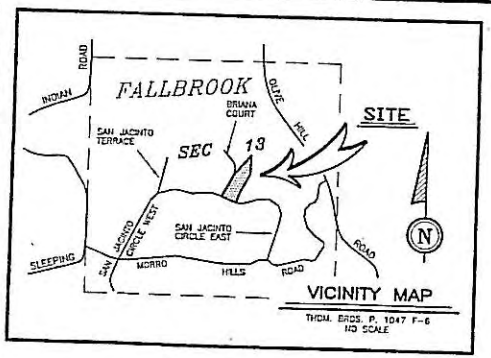
Q = 11.3 cfs exceed 9.9 cfs ∴ OK

V = 2.6 ft/sec.

HOBBS
TPM 20985
William Karn Surveying, Inc.
San Jacinto Circle & Briana Court


SAN
JACINTO
CIRCLE
EAST
655.5
650.5
624.5
594.0
675
625
600
609.0
575
586.0
589.0
577.5
550
596.0
592.5
525
639.5
RD
33°18'
SCALE 1" = 100'

PRELIMINARY GRADING PLAN



LEGEND

ITEM	S.D.R.S.D./B.M.P.*	SYMBOL
EXIST. CONTOUR		650
PROP. CONTOUR		650
FILL SLOPE – 2:1	SS-7*	
CUT SLOPE – 1.5:1	SS-7*	
PROP. SPOT ELEVATION		650
6" EARTHEN BERM	SS-9	B B
PROP. EARTHEN BROW DITCH	SS-9	
PROP. ROCK RIP RAP (10"X10"X1.0') #2 BACKING OVER 1/4" GRAVEL FILTER BLANKET(0.5' THICK). TYPE 2, V=7-8 FT./SEC.	D-40/SS-10*	
SILT FENCE	SC-1*	SF SF
STABILIZED CONSTRUCTION ENTRANCE	TC-1*	
GRAVEL BAGS	SC-6*	
BIO FILTER		
GRASS SWALE		

LEGEND

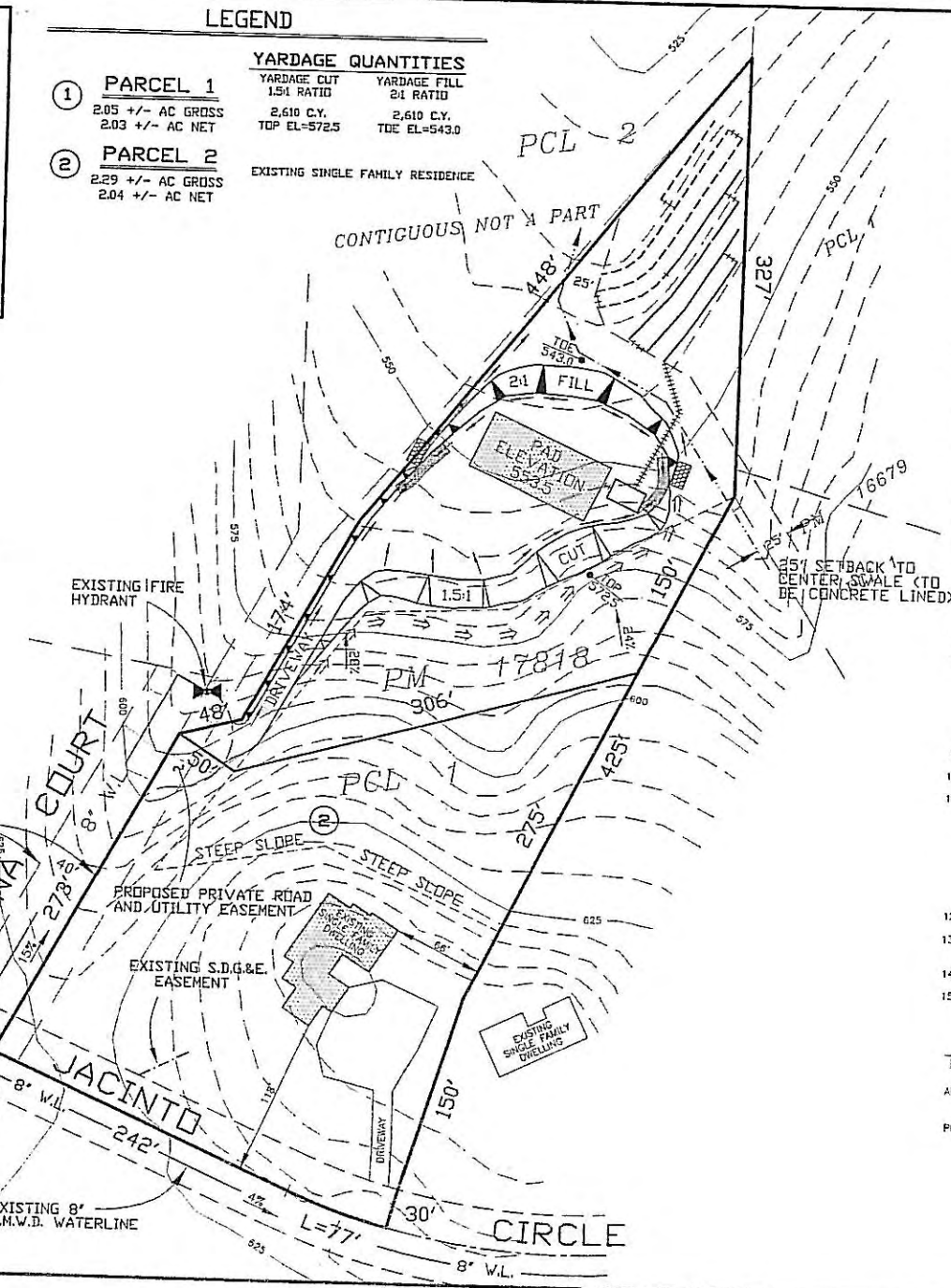
(1) **PARCEL 1**
2.05 +/- AC GROSS
2.03 +/- AC NET

(2) **PARCEL 2**
2.29 +/- AC GROSS
2.04 +/- AC NET

YARDAGE QUANTITIES

YARDAGE CUT 1.5:1 RATIO	YARDAGE FILL 2:1 RATIO
2,610 C.Y. TOP EL=572.5	2,610 C.Y. TOE EL=543.0

EXISTING SINGLE FAMILY RESIDENCE



REPLACEMENT
TENTATIVE PARCEL MAP 20985

LAND DIVISION STATEMENT – OWNER'S CERTIFICATE

I HEREBY CERTIFY THAT I AM THE RECORD OWNER, AS SHOWN ON THE LATEST EQUALIZED COUNTY ASSESSMENT OF THE PROPERTY SHOWN ON THE TENTATIVE PARCEL MAP. ALL OF MY CONTIGUOUS OWNERSHIP WITHIN AND BEYOND THE BOUNDARIES OF THE TENTATIVE PARCEL MAP IS SHOWN. THE BASIS OF CREATION OF THE LOTS IN MY OWNERSHIP (I.E. PARCEL MAP, FINAL MAP, CERTIFICATE OF COMPLIANCE, RECORDED DEED BEFORE 2/1/72) AS INDICATED ON THE TENTATIVE. I UNDERSTAND THAT PROPERTY IS CONSIDERED CONTIGUOUS EVEN IF IT IS SEPARATED BY ROADS, STREETS, UTILITY EASEMENTS OR RAILROAD RIGHTS-OF-WAY. "FREEWAY" AS DEFINED IN SECTION 23.5 OF THE STREETS AND HIGHWAY CODES, SHALL NOT BE CONSIDERED AS ROADS OR STREETS.

I FURTHER CERTIFY THAT I WILL NOT, BY THIS APPLICATION, CREATE OR CAUSE TO BE CREATED, OR WILL NOT HAVE PARTICIPATED IN THE CREATION OF MORE THAN FOUR PARCELS ON CONTIGUOUS PROPERTY UNLESS SUCH PARCELS WERE CREATED BY MAJOR SUBDIVISION. FOR PURPOSES OF THIS CERTIFICATION, THE TERM "PARTICIPATED" MEANS HAVING COOPERATED WITH OR ACTED IN A PLANNING, COORDINATE OR DECISION-MAKING CAPACITY IN ANY FORMAL OR INFORMAL ASSOCIATION OR PARTNERSHIP FOR THE PURPOSE OF DIVIDING REAL PROPERTY.

I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT. EXECUTED THIS _____ DAY OF MARCH, 2007, IN FALLBROOK, CALIFORNIA.

ADDRESS: 4932 SAN JACINTO CIRCLE
FALLBROOK, CA 92028
PHONE: (760) 728-6277

BRIAN J. HOBBS OWNER

MARYANN HOBBS OWNER

1. COMPLETE TAX ASSESSOR'S NUMBER: 121-230-39
2. ABBREVIATED LEGAL DESCRIPTION: PORTION OF PARCEL 1 AND PARCEL 2 OF PARCEL MAP NO. 17818
3. GENERAL PLAN REGIONAL CATEGORY: E.D.A.
4. COMMUNITY/SUBREGIONAL PLAN AREA: FALLBROOK COMMUNITY PLAN
5. LAND USE DESIGNATION(S): 17 ESTATE
6. EXISTING ZONING: A-70 2 AC.
7. GRADING: NONE PROPOSED
8. TOPOGRAPHY: COUNTY TOPO MAP 414-1689

USE REGULATIONS	A-70
NEIGHBORHOOD REGS	L
DENSITY	.50
LOT SIZE	2 AC.
BUILDING TYPE	C
MAX FIR AREA	–
FIR AREA RATIO	–
HEIGHT	G
COVERAGE	–
SETBACK	C
OPEN SPACE	–
SPECIAL AREA REGS	–

9. TAX RATE AREA: 75015
10. ASSOCIATED PERMITS: N/A
11. LOCATION AND STATUS OF EXISTING LEGAL ACCESS TO SUBJECT PROPERTY FROM A PUBLICLY MAINTAINED ROAD, (i.e. RECORDED EASEMENT, UNRECORDED IDENTIFY AND SPECIFY WIDTH): ACCESS FROM "OLIVE HILL ROAD", WHICH IS A PUBLICLY MAINTAINED ROAD, TO THE BOUNDARY OF SUBJECT PROPERTY IS OVER A PORTION OF SAN JACINTO CIRCLE EAST AND MORRO HILLS ROAD, WHICH IS MAINTAINED BY THE MORRO HILLS COMMUNITY SERVICE DISTRICT AS A PRIVATE ROAD. SEE LETTER FROM MORRO HILLS COMMUNITY SERVICE DISTRICT DATED 4/21/1988 ON FILE IN THE OFFICE OF THE COUNTY ENGINEER.
12. WATER SOURCE/ WATER DISTRICT: RAINBOW MUNICIPAL WATER DISTRICT
13. SEPTIC/SEWER DISTRICT: PARCEL 1 – EXISTING SINGLE FAMILY DWELLING
PARCEL 2 – SUBSURFACE DISPOSAL
14. FIRE DISTRICT: NORTH COUNTY FIRE PROTECTION DISTRICT
15. SCHOOL DISTRICT: FALLBROOK UNION ELEMENTARY AND FALLBROOK UNION HIGH SCHOOL

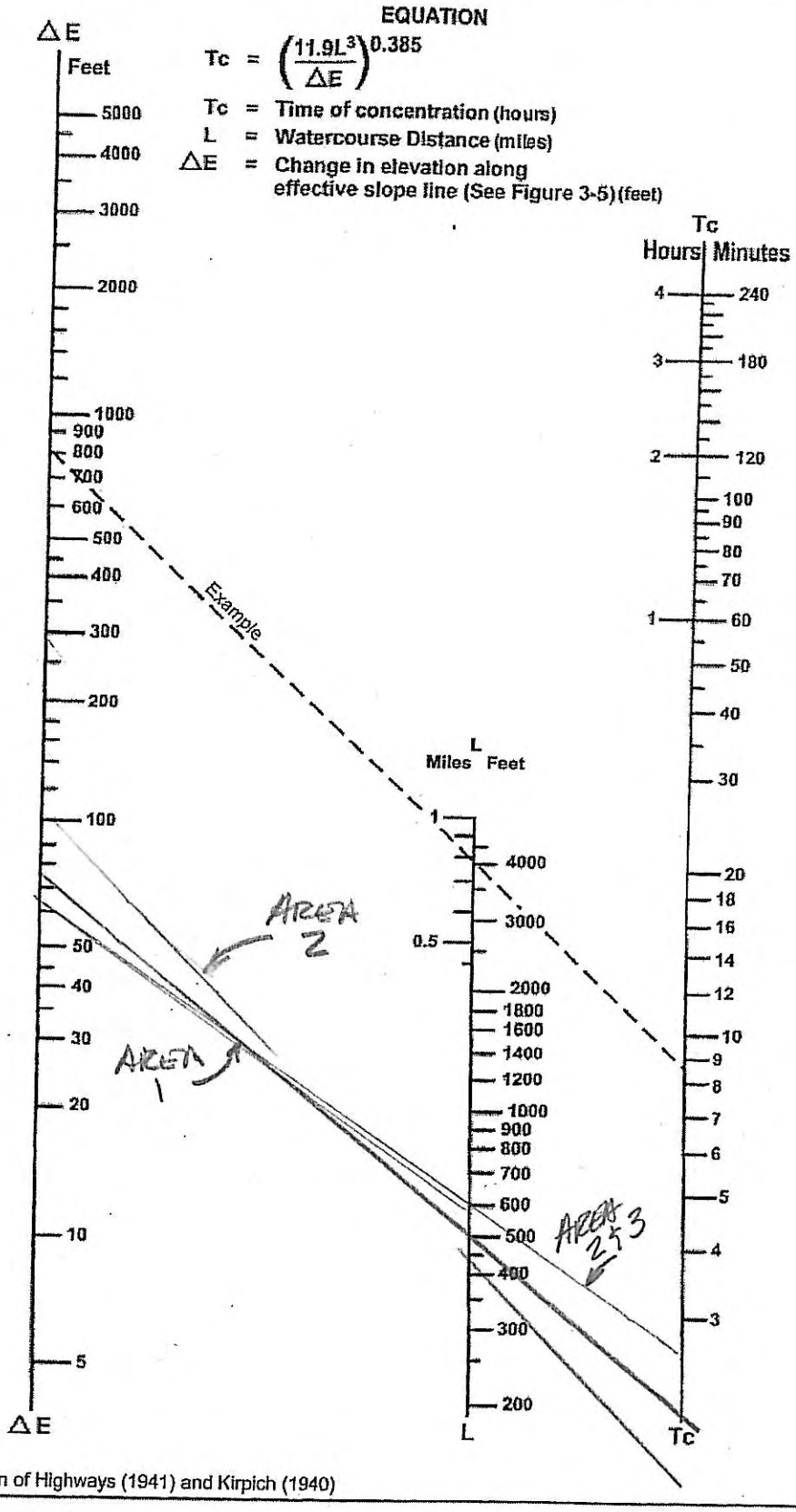
BRIAN J. HOBBS OWNER

HADLEY JOHNSON 3/6/07 RCE 14870

ADDRESS: 4932 SAN JACINTO CIRCLE
FALLBROOK, CA 92028
PHONE: (760) 728-6277

PREPARED BY:
WM. KARN SURVEYING INC.
129 WEST FIG ST.
FALLBROOK, CA 92028
760-728-1134 LS 2961/RCE 14870

I:\8092\REPLACEMENT TPM



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

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

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

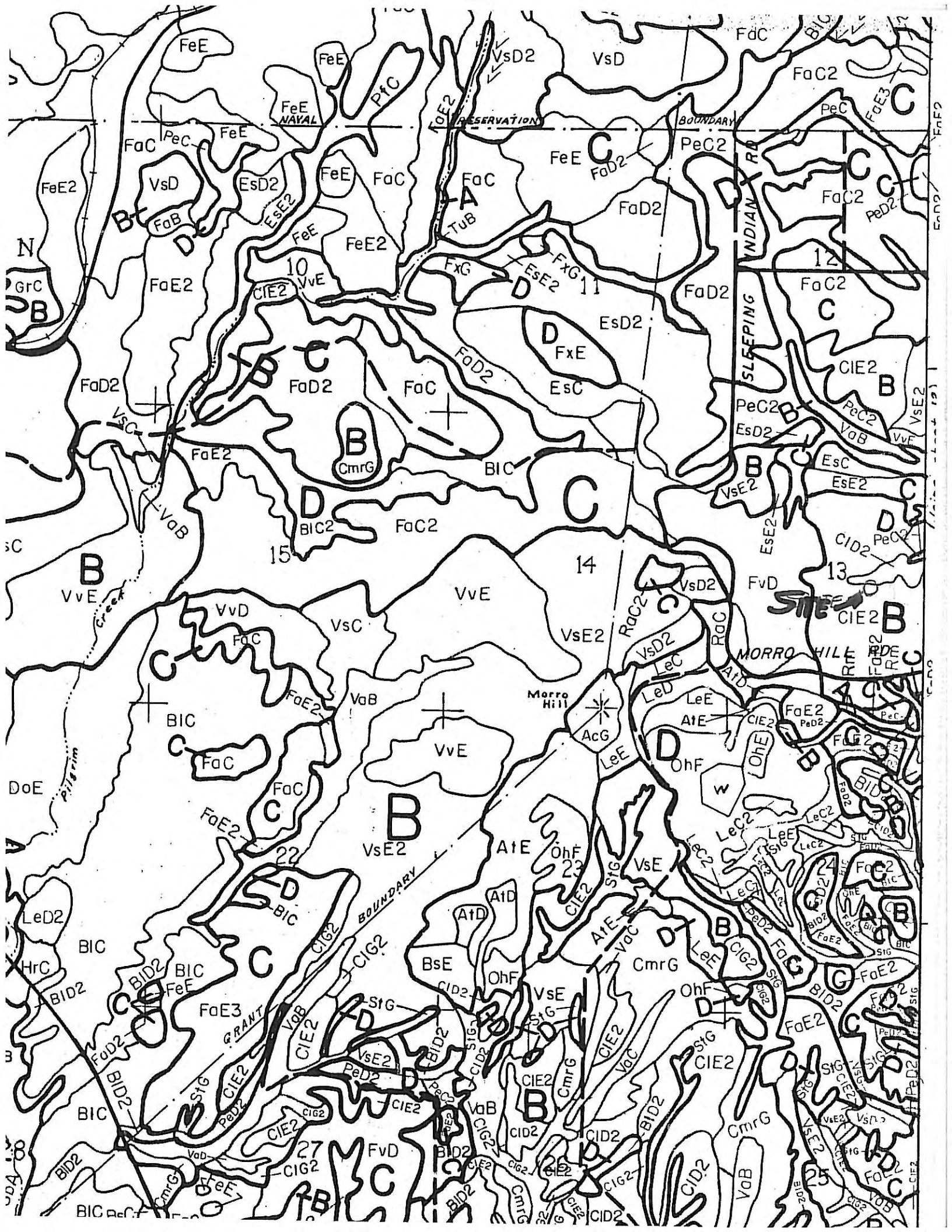
Element*	DU/	.5%		1%		2%		3%		5%		10%	
	Acre	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	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

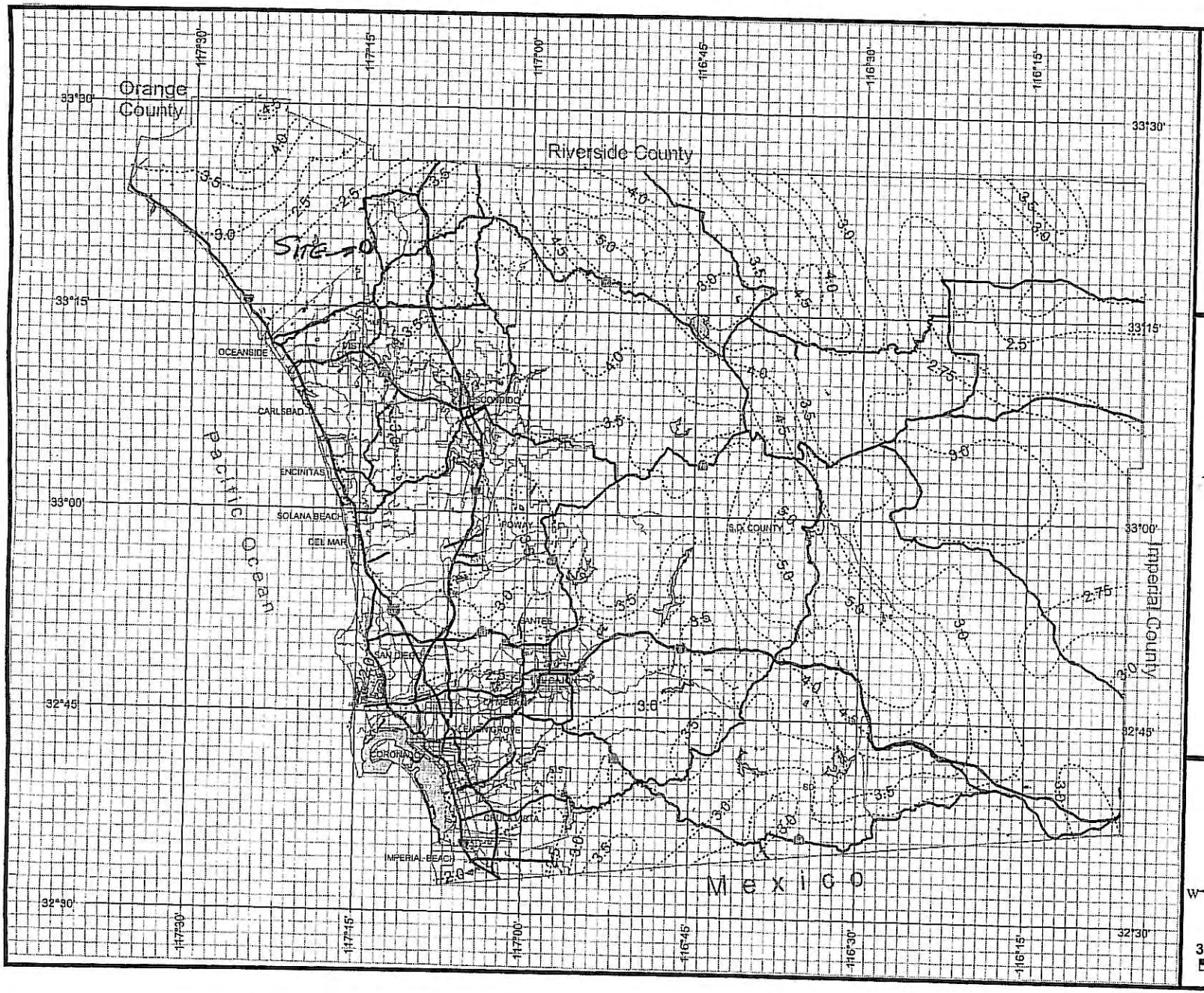
*See Table 3-1 for more detailed description

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


NAVAL RESERVATION BOUNDARY
SLEEPING INDIAN RD
MORRO HILL RD
Morro Hill
Pilgrim Creek
GRANT BOUNDARY
SITE
10
11
12
13
14
15
22
23
24
25
27
FeE
FaC
FaC2
FaD2
FaE2
FaE3
FeE2
VsD
VsD2
VsE2
VvE
VvD
VsC
VaB
VaC
VsE
PeC
PeC2
PeD2
PfC
EsD2
EsE2
EsC
FxE
FxG
TuB
ClE2
ClD2
ClG2
BlC
BlC2
BlD2
CmrG
AcG
AtE
AtD
BsE
OhF
OhE
LeC
LeD
LeE
LeC2
LeD2
FvD
FaB
GrC
DoE
HrC
StG
RaC
RaC2
W



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Division

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

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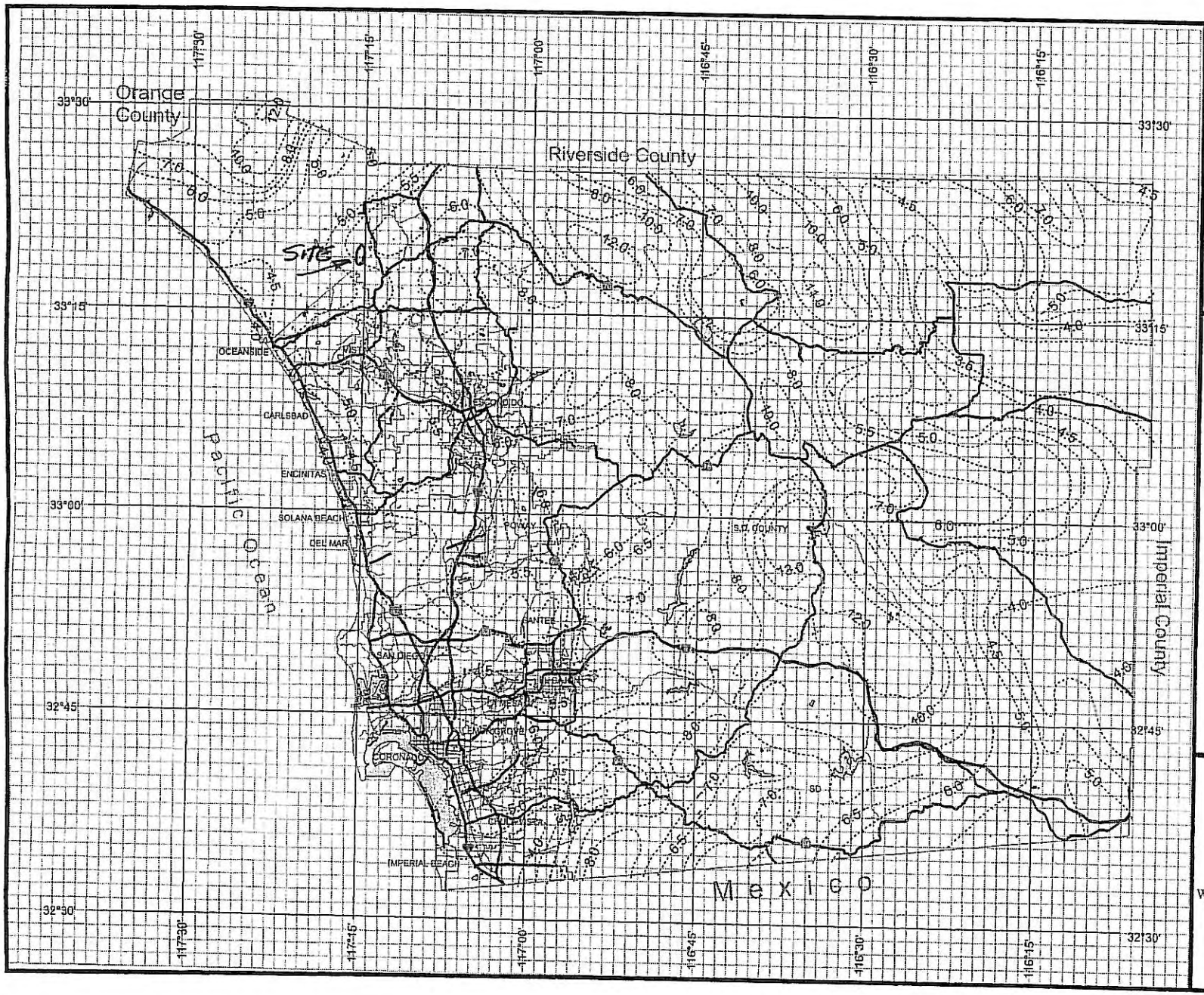

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS

SanGIS We Have San Diego Covered!

N W E S

3 0 3 Miles

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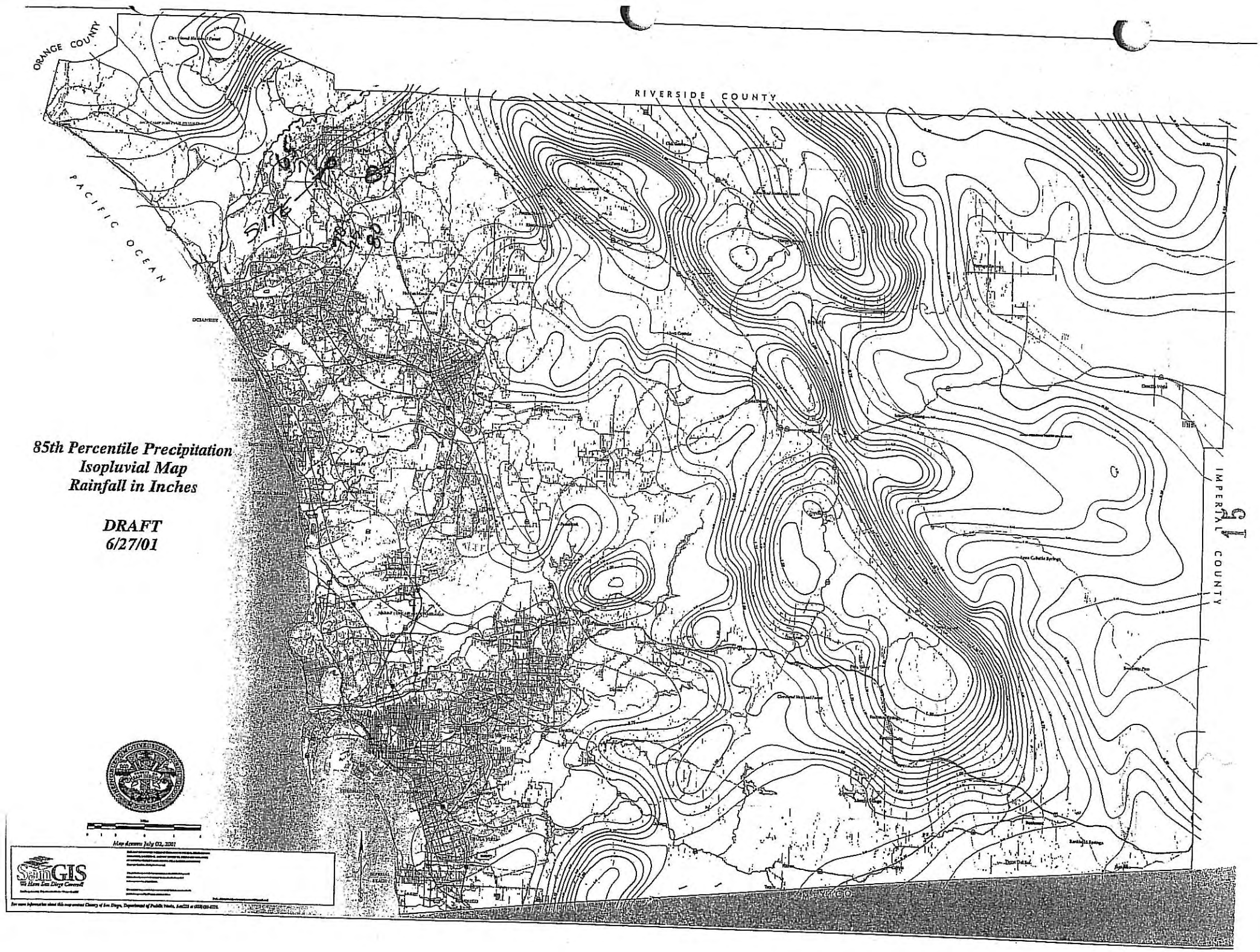
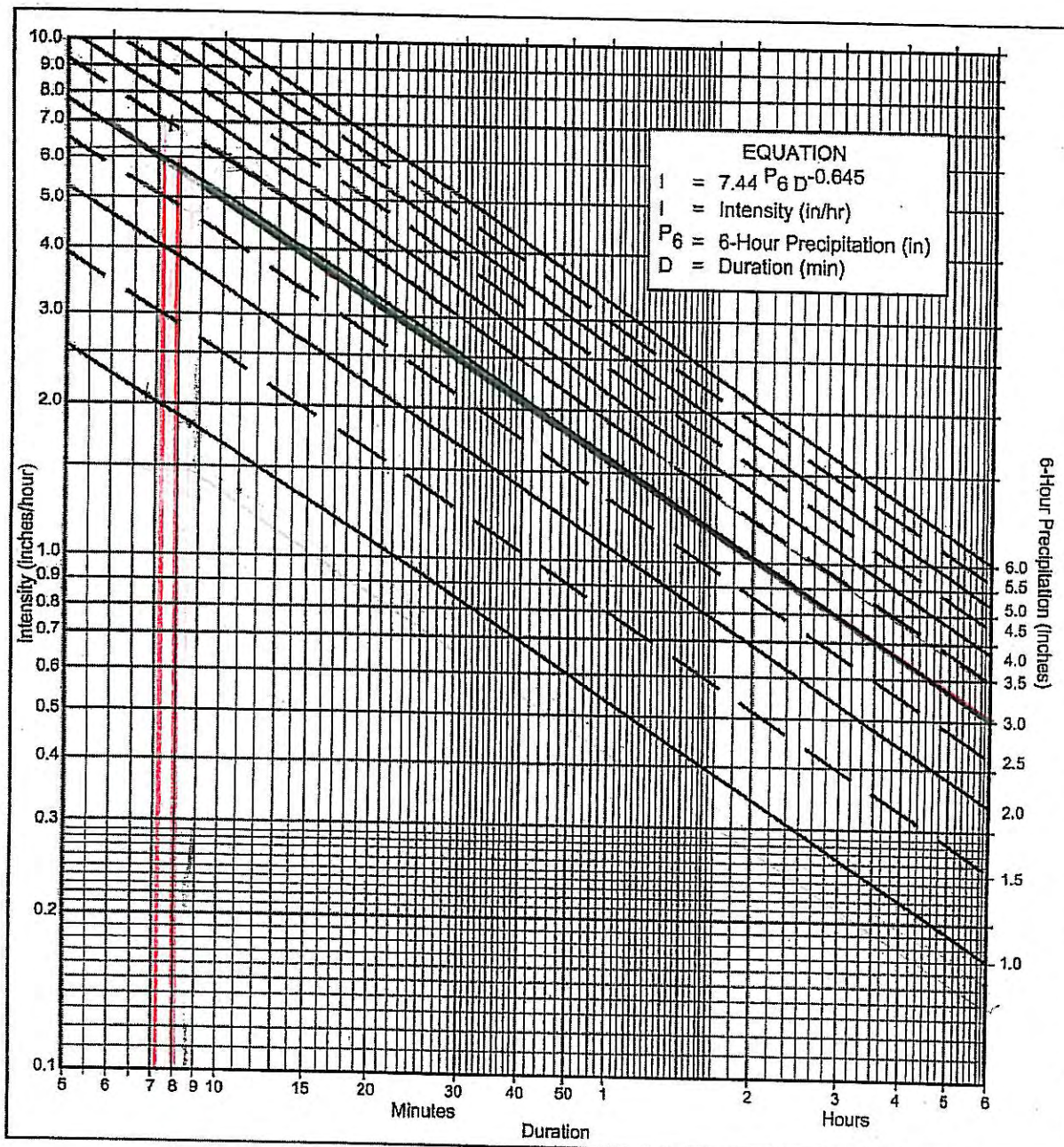


85th Percentile Precipitation
Isopluvial Map
Rainfall in Inches

DRAFT
6/27/01



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} = 6.0, $\frac{P_6}{P_{24}}$ = 50 %(2)

(c) Adjusted $P_6^{(2)}$ = 3.0 in.

(d) t_x = 8 min.

(e) I = 6 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