

RANDY LANE TPM

3364 RANDY LANE
BONITA, CA

PDS2013-TPM-21197

PRELIMINARY HYDROLOGIC & HYDRAULIC REPORT

June 27, 2014



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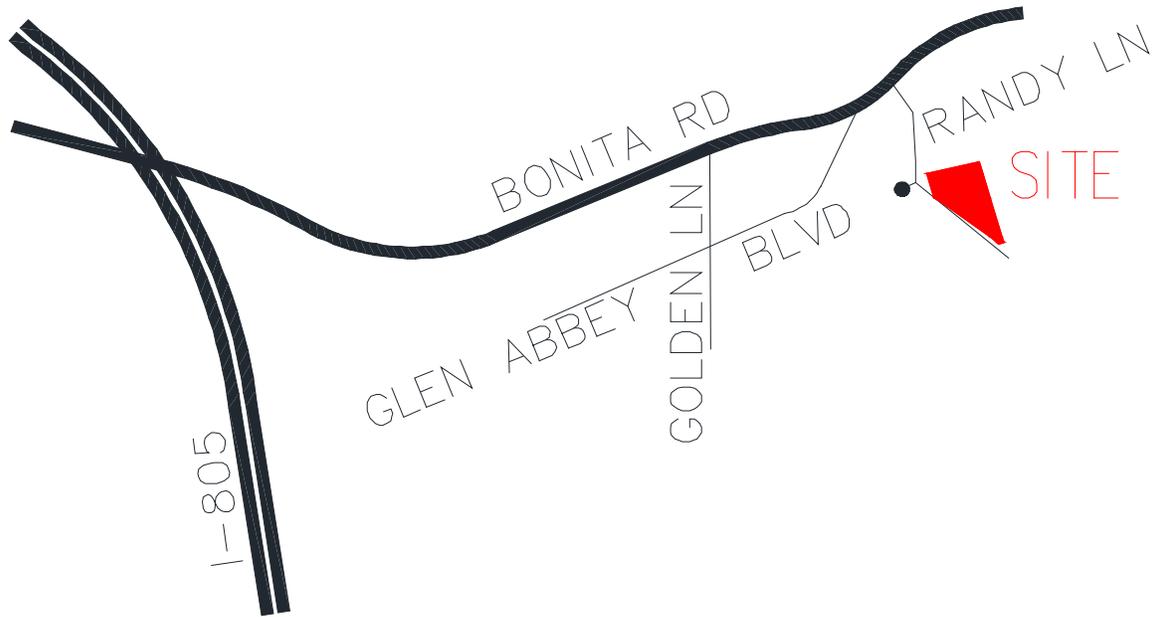
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I. VICINITY MAP



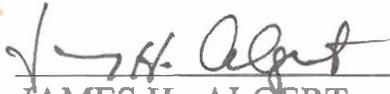
VICINITY MAP

NO SCALE

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 PROFESSIONS 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 ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



JAMES H. ALGERT

RCE 19073

EXP. 09-30-15

6-27-2014

DATE

II. SCOPE OF WORK & PROJECT DESCRIPTION

The scope of this study is to provide preliminary hydrologic and hydraulic calculations for the Randy Lane TPM. The site is located southerly of Bonita Road along the easterly side of Randy Lane within the County of San Diego and approx. 3 miles way from the Dam Inundation Zone. In addition, see attached FLOOD INSURANCE RATE MAP which describes that the Randy Lane Property area not within the limits of a dam inundation zone. The existing project site is mostly undeveloped land except for an existing house and concrete brow ditch running parallel to Randy Lane. The proposed work for this project will consists of partitioning the parcel into 4 separate parcels and a shared driveway.

III. HYDROLOGIC METHODOLOGY

A hydrologic analysis was made to estimate peak flood flows with return period of 100 years.

This hydrologic analysis was made by the use of a topographic survey by Algert Engineering, Inc. and the proposed construction drawings.

The rational method of runoff computation was used to determine the quantity of storm water runoff.

The basic rational formula is $Q=CIA$ where:

- "Q" is the peak rate of flow in cubic feet per second (CFS).
- "C" is a runoff coefficient expressed as that percentage of rainfall, which becomes surface runoff. We are using soil group 'D'.
- "I" is the average rainfall intensity in inches per hour for a storm duration equal to the time of concentration (t_c) of the contributing drainage area.
- "A" is the drainage area in acres tributary to design point.
- " t_c " is the time of concentration required for runoff to flow from the most remote part of the watershed to the outlet point under consideration.

A spreadsheet of the above items is shown in *Appendix B*: and are calculated per the County of San Diego Hydrology Manual.

IV. EXISTING HYDROLOGIC CONDITIONS

The existing project site drainage area is approx. 3.23 acres and is mostly undeveloped with one existing house located at the northerly portion of the property. The site generally slopes from south to north with slopes ranging from 0 to 25%. Per Section 3.1.2. of the County Hydrology Manual, the percent of Impervious areas was calculated for each area and resulting in an average runoff coefficient of 0.30. Runoff generated by the site, sheet flows toward the northwesterly corner of the property where it discharges in 3 different locations in to the curb and gutter system on Randy Lane.

Discharge Point 1 includes existing areas Ex. B-0 and Ex. B-1 (see existing Hydrology Map). Runoff generated by the site, sheet flows toward the northwesterly corner of the property where it discharges approx. 2.55 cfs in to the existing curb and gutter system on Randy Lane.

Discharge Point 2 includes existing areas Ex. A-3, Ex. A-4 and Ex. A-5 (see existing Hydrology Map). Runoff generated by the site, sheet flows toward the existing concrete browditch and discharges approx. 0.45 cfs in to the existing curb and gutter system on Randy Lane.

Discharge Point 3 includes existing areas Ex. A-0, Ex. A-1 and Ex. A-2 (see existing Hydrology Map).

Runoff generated by the site, sheet flows toward on site existing inlet and discharges approx. 2.60 cfs from the outlet in to the existing curb and gutter system on Randy Lane.

The total calculated discharge in to the existing curb and gutter system on Randy Lane is approx. 5.60 CFS for a 100 year storm and sheet flows downstream approx. 160 feet in to the existing 14 feet grated inlet.

V. PROPOSED HYDROLOGIC CONDITIONS

The proposed drainage areas will have similar characteristics to the existing conditions with the exception of the proposed driveway and pad areas for each lot that shall increase the impervious hardscape on the site by 0.25 acres. The surface runoff will be increase from 5.60 cfs to 7.87 cfs for a 100-year storm event. Drainage from the site will remain relatively the same as the pre-developed site.

The proposed generated sheet flow rate difference of 2.27 CFS shall be captured by the proposed catch basins, storm drain systems, brow ditches and bioswales. The proposed drainage area within the improvement area drains to the proposed catch basin and storm drain system where they discharge into the existing 30" RCP pipe.

Drainage patterns in areas EXA-0, thru EXA-5 remain undisturbed in the post development condition and are described in the existing hydrologic conditions above. (Discharge points 2 and 3).

The post development area for discharge point 1 are B-0 thru B-8, C-0 thru C-5 will have proposed extended bioswales and located in the southerly side of proposed Permeable Pavers Private Road Easement and designed to mitigate the peak flow rate for a 100-year storm drain event. They also treat the storm water for the anticipated pollutants of concern generated on our site and play a major role in treatment for coarse sediment, trash and pollutants that tend to associate with fine particles during treatment.

Note: An existing 10 ft. wide Sweetwater Authority slope easement adjacent to the easterly side of Randy Lane will remain undisturbed, however a 20 ft. Sweetwater Authority Drainage easement running parallel to Randy Lane currently has a concrete brow ditch which will be removed and replaced with a vegetated swale. The vegetated swale will allow for better treatment and reduced velocities of stormwater runoff.

	CALCULATIONS SUMMARY			
STORM	DISHARGE POINT 1	DISHARGE POINT 2	DISHARGE POINT 3	100
PRE DEVELOP	2.55	0.45	2.60	5.60
POST DEVELOP	4.82	0.45	2.60	7.87
INCREASE	2.27	0	0	2.27

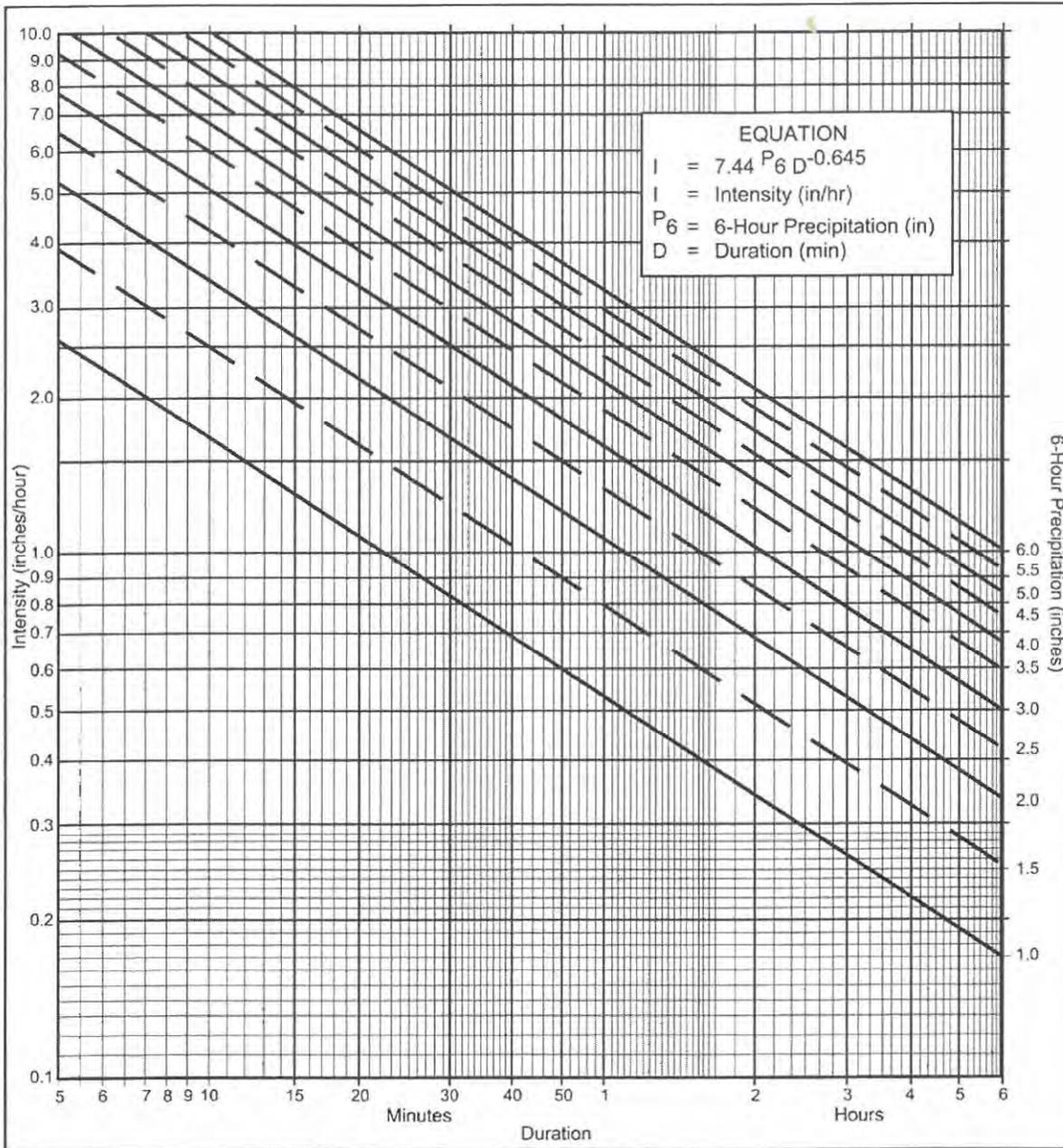
SUMMARY

The site is located 3364 Randy Lane, Bonita, California. The existing project site drainage area is approx. 3.23 acres and is mostly undeveloped with one existing house located at the northerly portion of the property. The proposed drainage areas will have similar characteristics to the existing conditions with exception of the proposed driveway and pad areas for each lot that shall increase the impervious hardscape on site by 0.25 ac. The surface runoff will be increase from 5.60 cfs to 7.87 cfs for a 100-year storm event. The increase in runoff will be mitigated by proposed bioswales. Therefore,

- 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 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 off-site.
- The proposed project would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems.
- The proposed project is not located within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps.

Appendix A: 2003 County of San Diego Hydrology Manual



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 applicable 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: SEE ATTACHED CHART

- (a) Selected frequency 100 year
- (b) $P_6 = 2.7$ in., $P_{24} = 5.0$, $\frac{P_6}{P_{24}} = 0.54\%^{(2)}$
- (c) Adjusted $P_6^{(2)} = 2.7$ in.
- (d) $t_x =$ _____ min.
- (e) $I =$ _____ 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
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

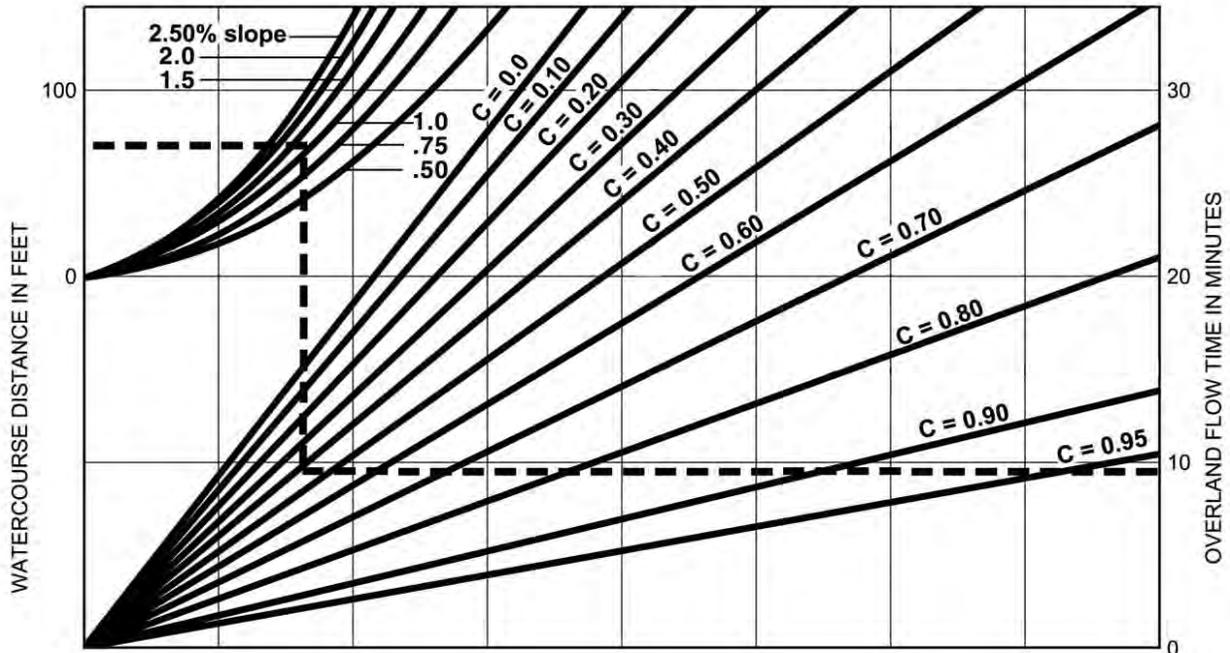
**Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS**

Land Use		Runoff Coefficient "C"				
		% IMPER.	Soil Type			
NRCS Elements	County Elements		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



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

Rational Formula - Overland Time of Flow Nomograph

F I G U R E

3-3

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.

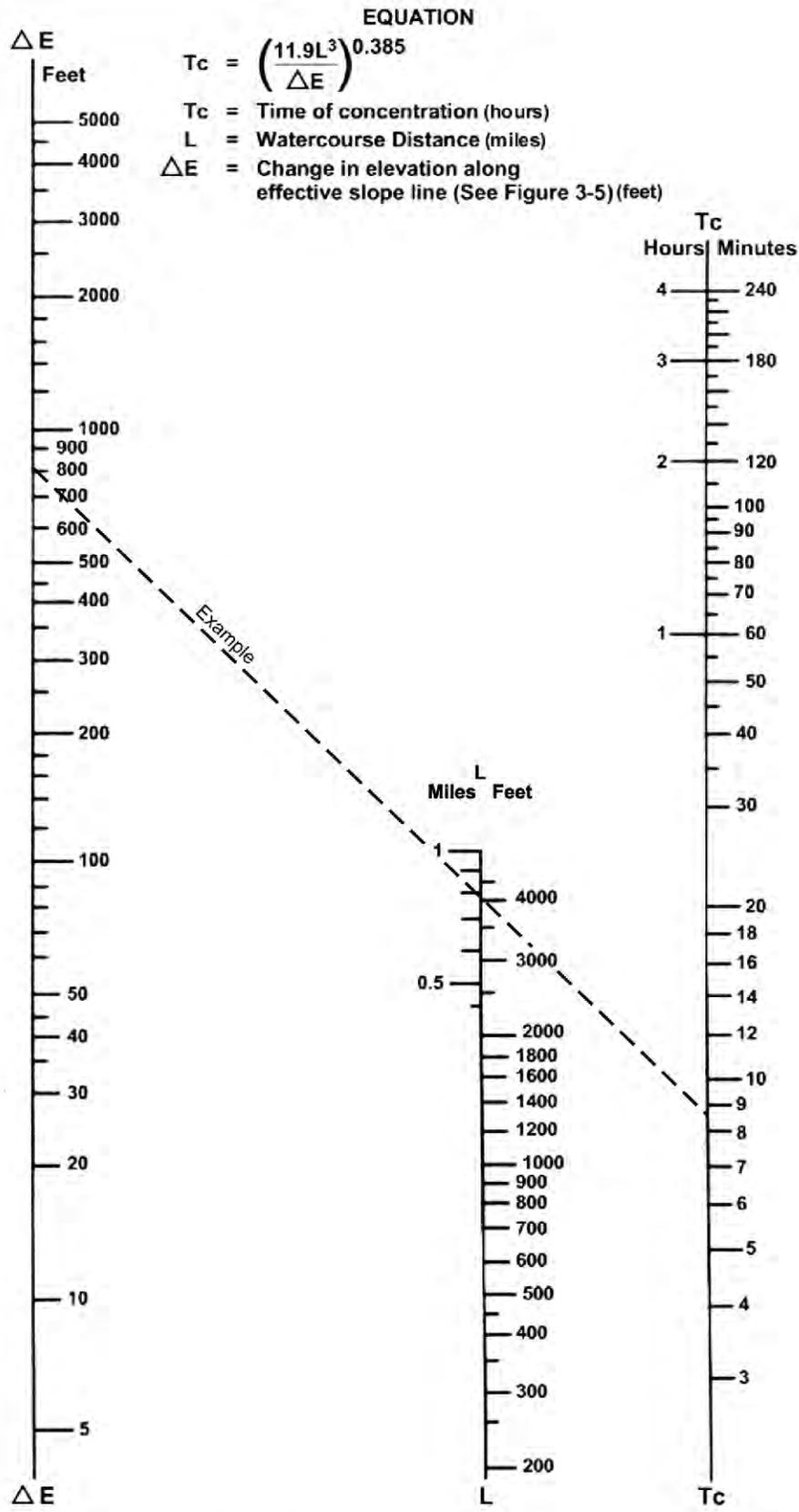
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved 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/ Acre	.5%		1%		2%		3%		5%		10%	
		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

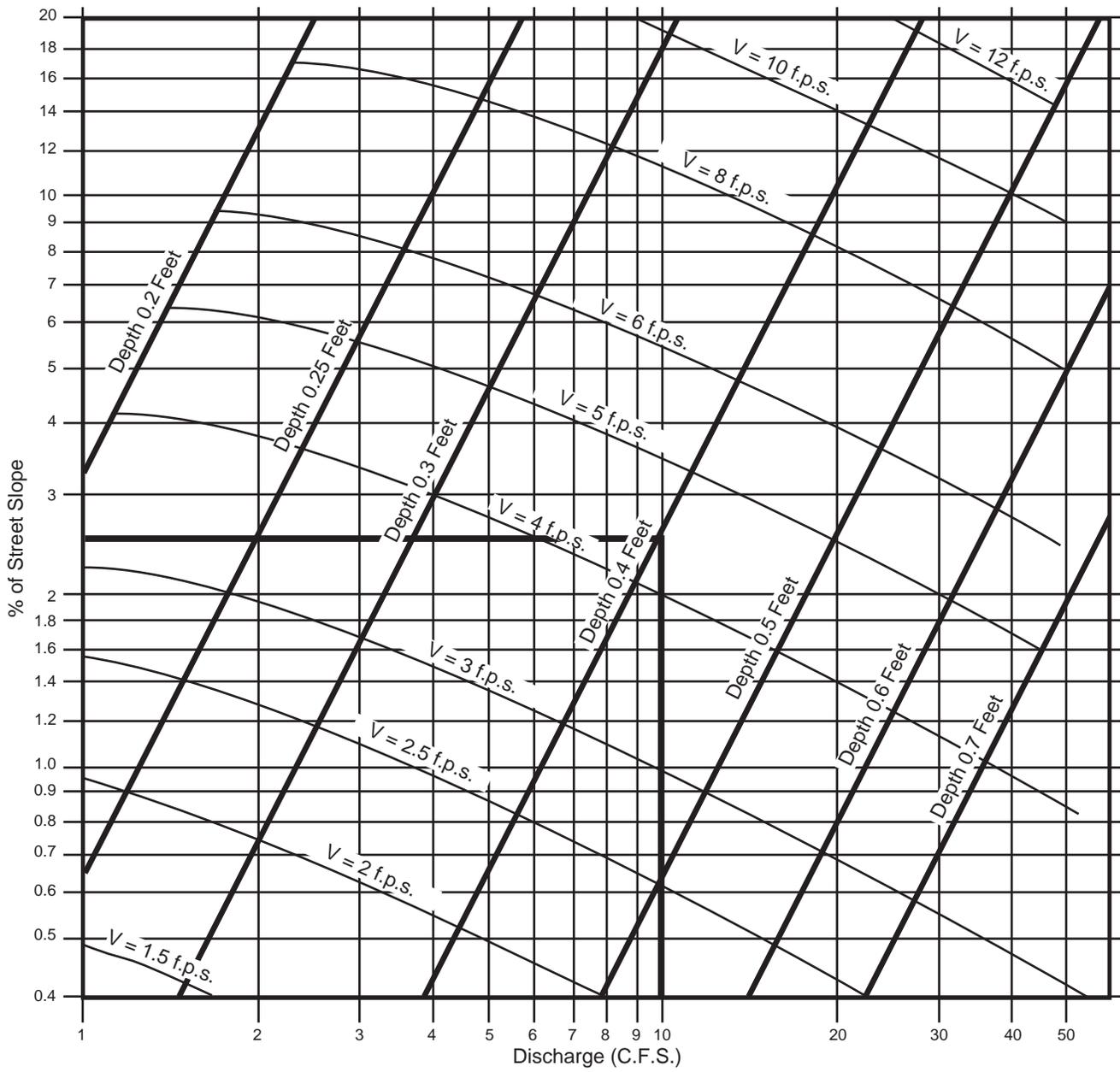
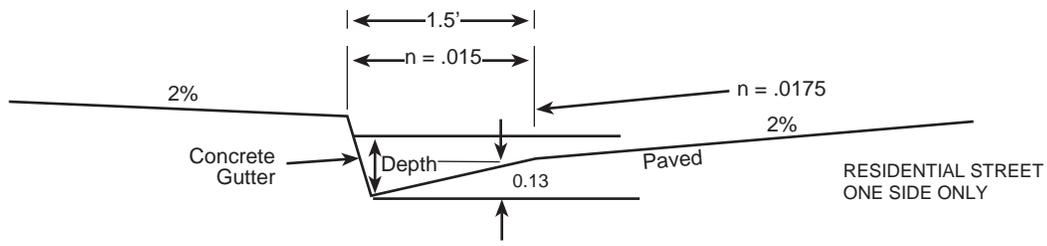


SOURCE: California Division of Highways (1941) and Kirpich (1940)

Nomograph for Determination of
Time of Concentration (T_c) or Travel Time (T_t) for Natural Watersheds

FIGURE

3-4



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

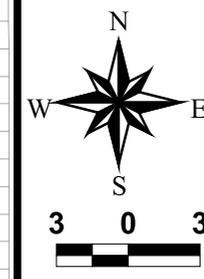
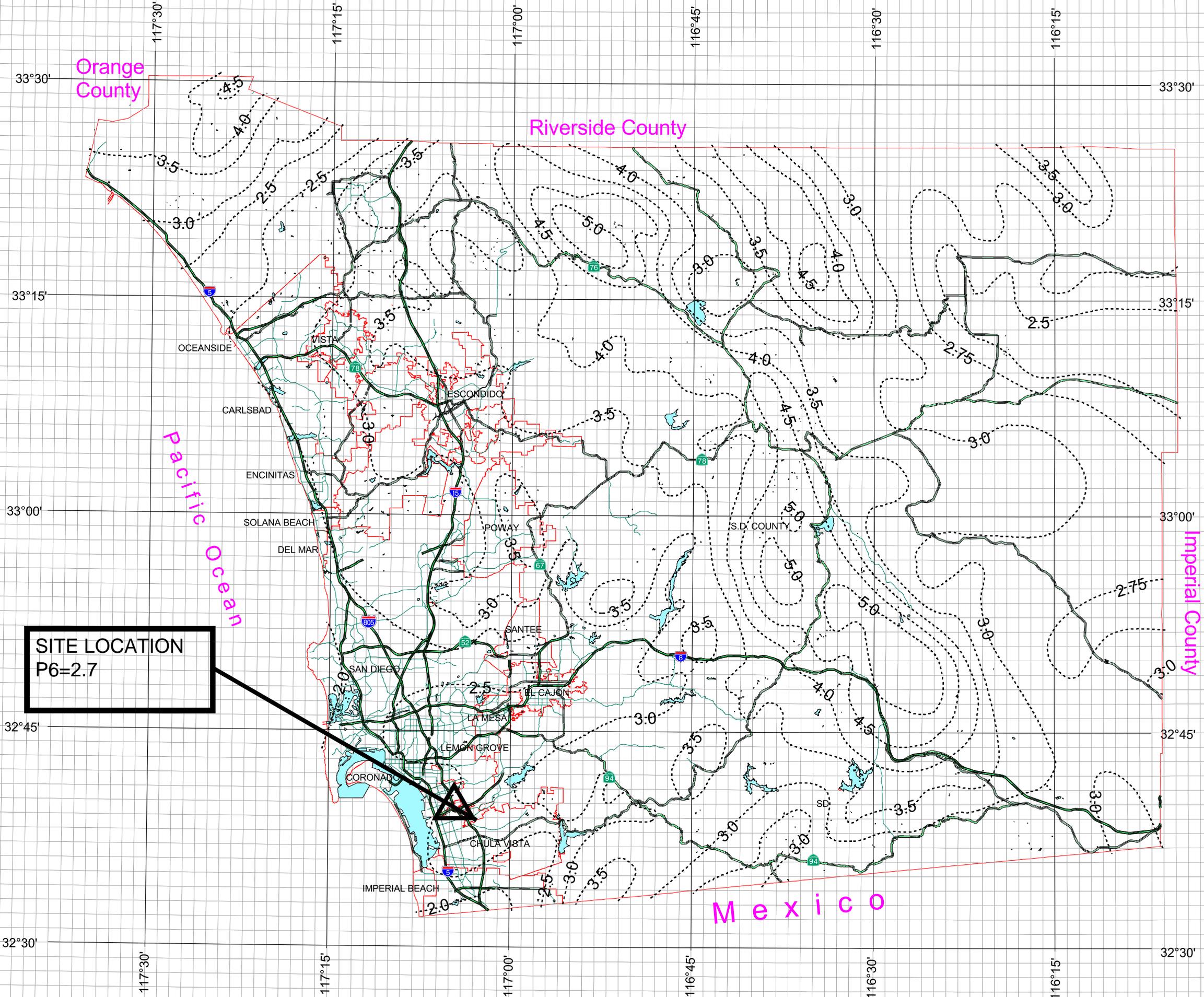
Gutter and Roadway Discharge - Velocity Chart

County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours



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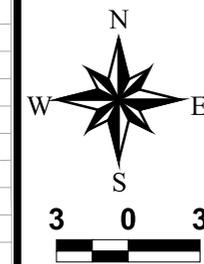
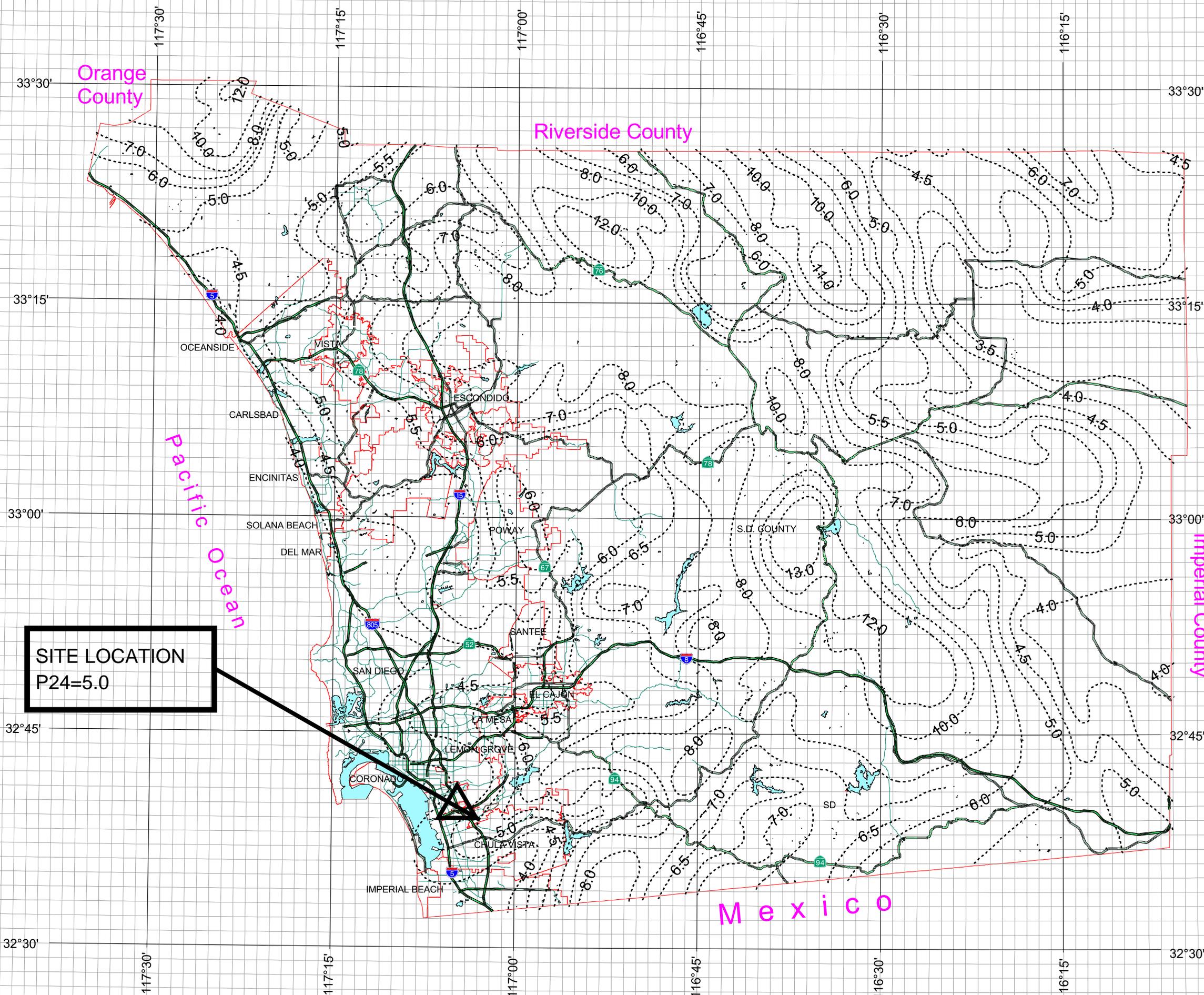
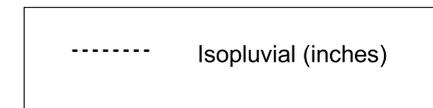
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County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

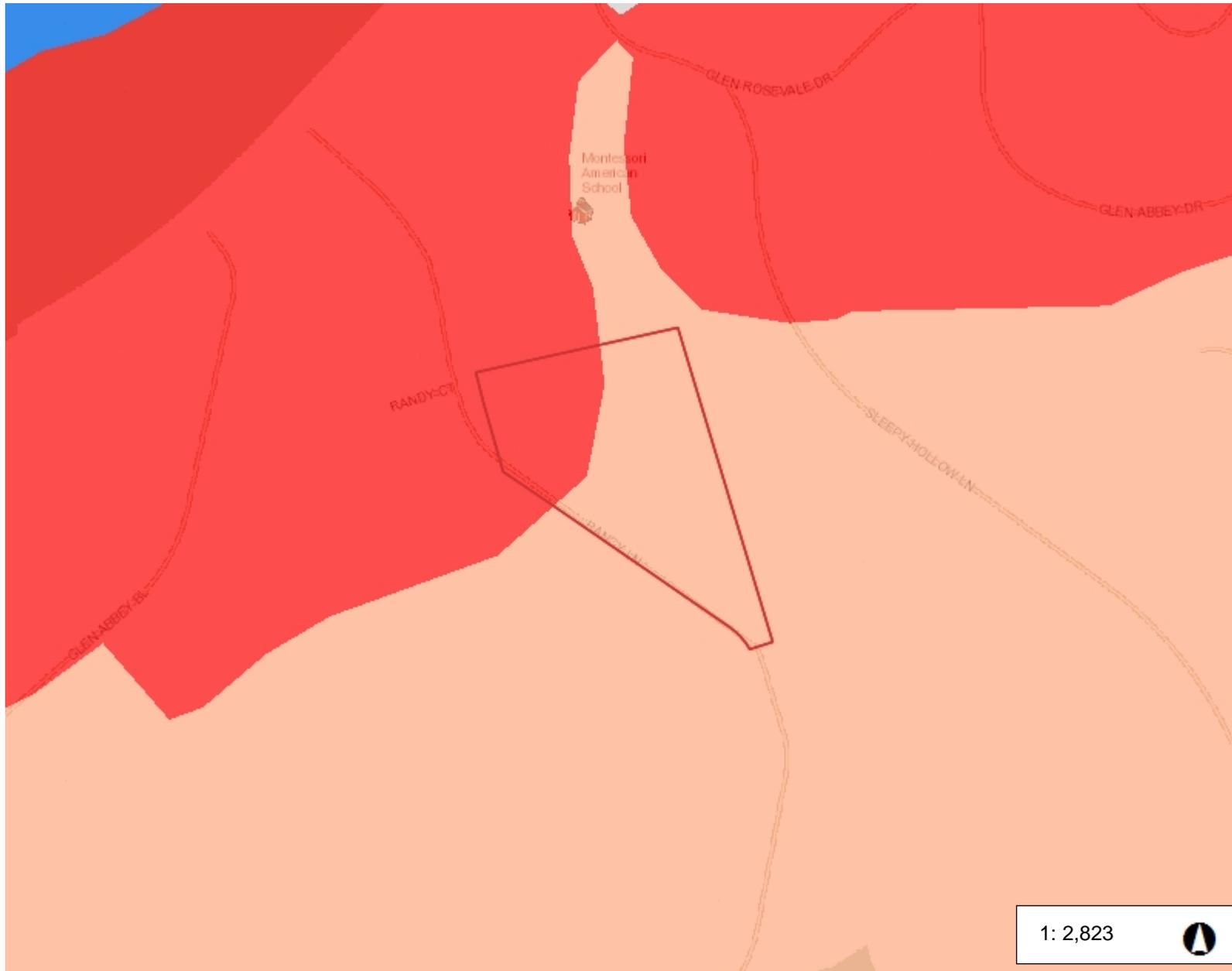
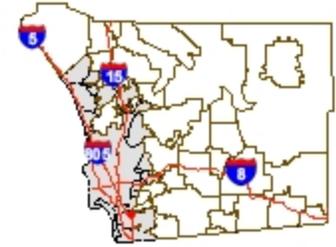


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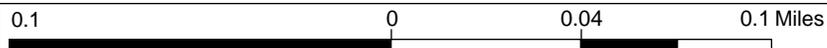




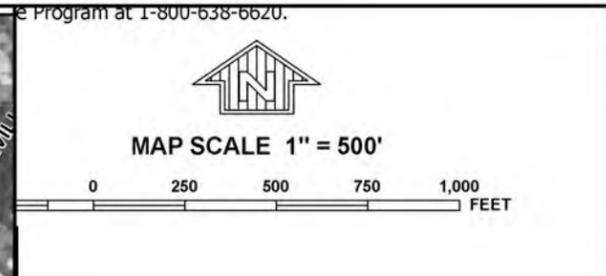
Legend

- Soil Hydrologic Group**
- Hydrologic Group Undefined
 - Hydrologic Group A
 - Hydrologic Group B
 - Hydrologic Group C
 - Hydrologic Group D

1: 2,823



Notes



NFIP PANEL 1918G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 1918 OF 2375
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHULA VISTA, CITY OF	065021	1918	G
SAN DIEGO COUNTY	060284	1918	G

Notice to User: The Map Number shown below should be used when placing map orders, the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C1918G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix B: Flow Data Spreadsheet

PROJECT: RANDY LANE TENTATIVE PARCEL MAP

PROJECT NO.: _____

ENGINEER: JIM ALGERT

DATE: June 27, 2014

Year Storm P₆ P₂₄ P₆/P₂₄

R.C.E. NO.: 73628

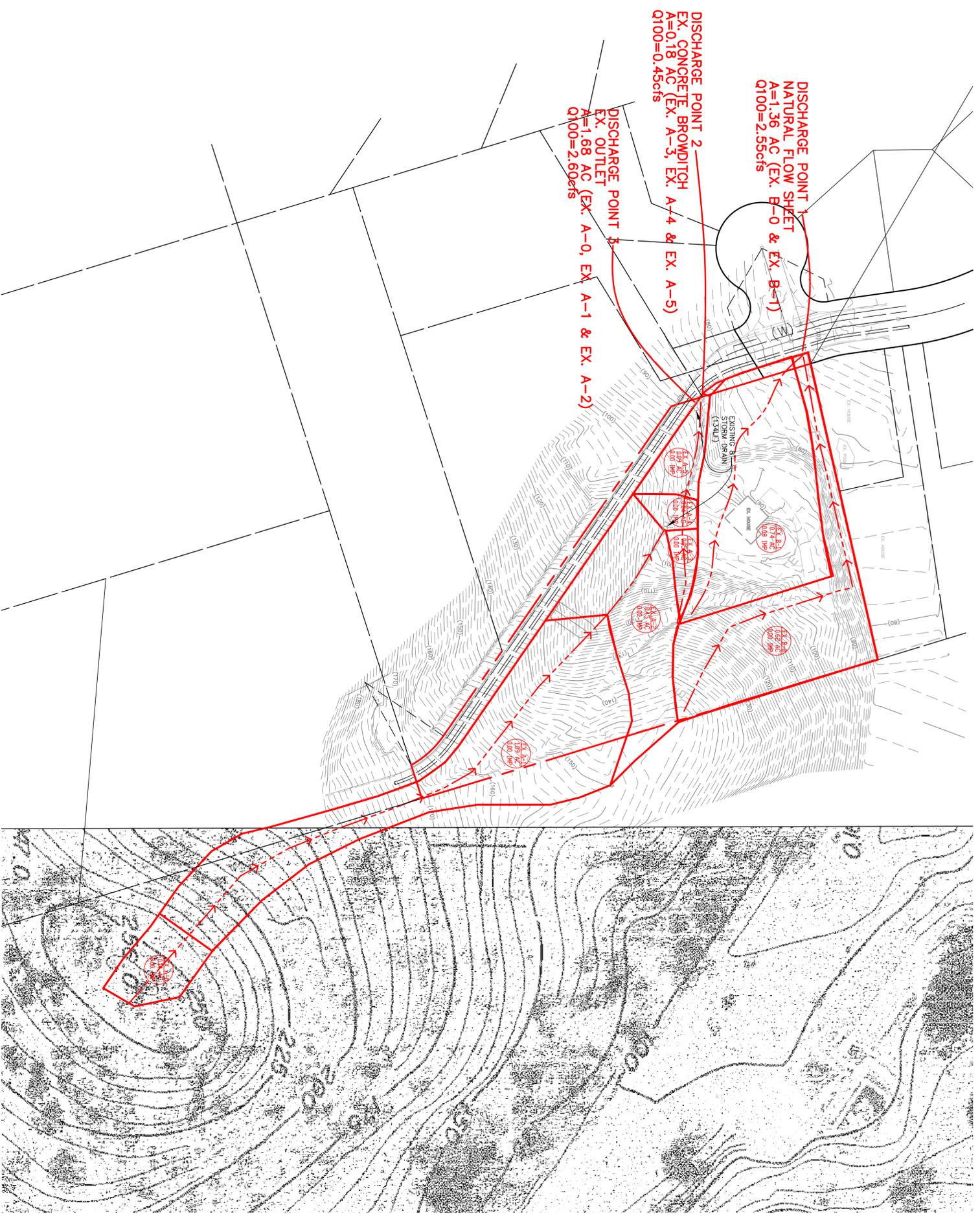
Note: Initial and Travel Times are calculated based on Fig 3-3 and 3-4 of the County Hydrology Manual

100 2.7 5.0 54.0%

T_{c, MINIMUM} = 5 minutes

DRAINAGE AREA NODE	AREA (AC.)	LENGTH OF FLOW (FT.)	SLOPE (%)	% IMPERVIOUS	C	Initial		Travel		Tc (per att. chart)	I (per att. chart)		Q (CFS)		
						Li	Ti	Lt	Tt			100		100	
POST - DEVELOPMENT															
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EX A-0	0.14	100	10.0%	0.0%	0.30	100	6.7	0	0.0	7			5.90		0.25
EX A-1	1.09	573	10.0%	0.0%	0.30	100	6.7	473	2.2	9			4.92		1.61
EX A-2	0.42	106	10.0%	0.0%	0.30	100	6.7	6	0.1	7			5.86		0.74
EX A-3	0.05	84	28.0%	0.0%	0.30	84	4.3	0	0.0	5			7.11		0.11
EX A-4	0.07	36	15.0%	0.0%	0.30	36	3.5	0	0.0	5			7.11		0.15
EX A-5	0.09	90	28.0%	0.0%	0.30	90	4.5	0	0.0	5			7.11		0.19
B-0	0.13	194	28.0%	0.0%	0.52	100	3.4	94	0.4	5			7.11		0.48
B-1	0.13	328	4.5%	0.0%	0.52	100	6.3	228	1.7	8			5.25		0.35
B-2	0.05	152	17.0%	10.0%	0.52	100	4.1	52	0.3	4			7.74		0.20
B-3	0.17	142	18.0%	20.0%	0.52	100	4.0	42	0.3	5			7.11		0.63
B-4	0.15	85	20.0%	30.0%	0.52	85	3.5	0	0.0	5			7.11		0.55
B-5	0.18	108	9.0%	30.0%	0.52	100	5.0	8	0.1	5			7.01		0.66
B-6	0.15	90	7.0%	30.0%	0.52	90	5.2	0	0.0	5			6.96		0.54
B-7	0.12	76	8.0%	35.0%	0.52	76	4.6	0	0.0	5			7.11		0.44
B-8	0.20	315	7.0%	10.0%	0.52	100	5.5	215	1.4	7			5.82		0.61
C-0	0.01	20	2.0%	0.0%	0.52	20	3.7	0	0.0	5			7.11		0.02
C-1	0.01	25	4.0%	0.0%	0.52	25	3.3	0	0.0	5			7.11		0.02
C-2	0.01	42	4.0%	0.0%	0.52	42	4.3	0	0.0	5			7.11		0.05
C-3	0.02	56	5.0%	0.0%	0.52	56	4.6	0	0.0	5			7.11		0.07
C-4	0.02	67	5.0%	0.0%	0.52	67	5.0	0	0.0	5			7.11		0.1
C-5	0.02	41	5.0%	0.0%	0.52	41	3.9	0	0.0	5			7.11		0.1

Appendix C: Hydrology Maps



PREPARED BY:

EXISTING HYDROLOGY

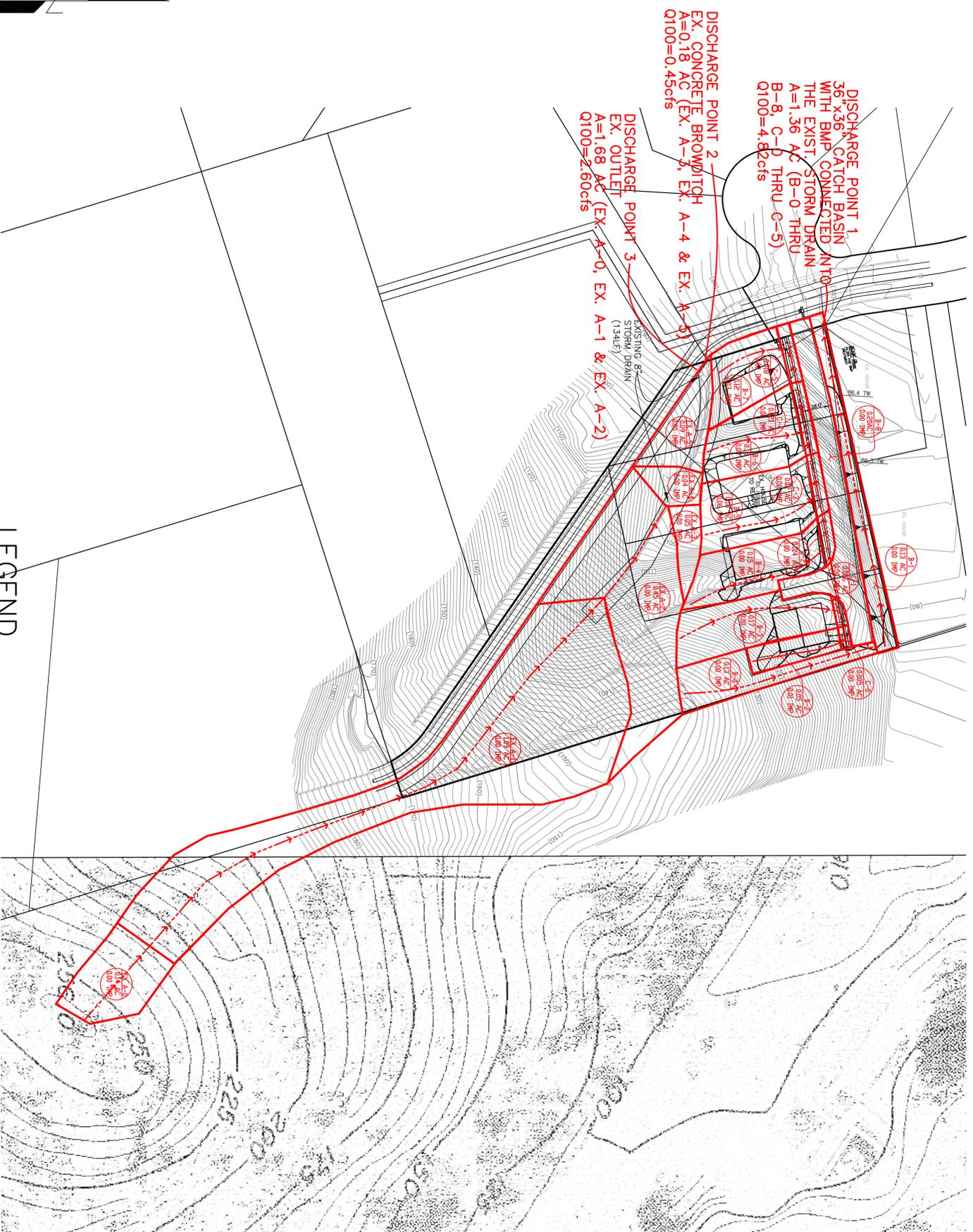
ALGERT ENGINEERING, INC.
 428 BROADWAY
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RANDY LANE TENTATIVE PARCEL MAP
 3364 RANDY LANE, BONITA, CA

DATE: JUNE 26, 2014

JOB NO. 7423

REVISION:



1 inch = 60 ft.

LEGEND

- BASIN LIMITS
- AREA ID
- AREA AC
- FLOW LINES



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PROPOSED HYDROLOGY

RANDY LANE TENTATIVE PARCEL MAP
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REVISION: