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HYDROLOGY ANALYSIS

AND

HYDRAULICS CALCULATIONS

FOR

25569 RUA MICHELLE, ESCONDIDO, CALIFORNIA

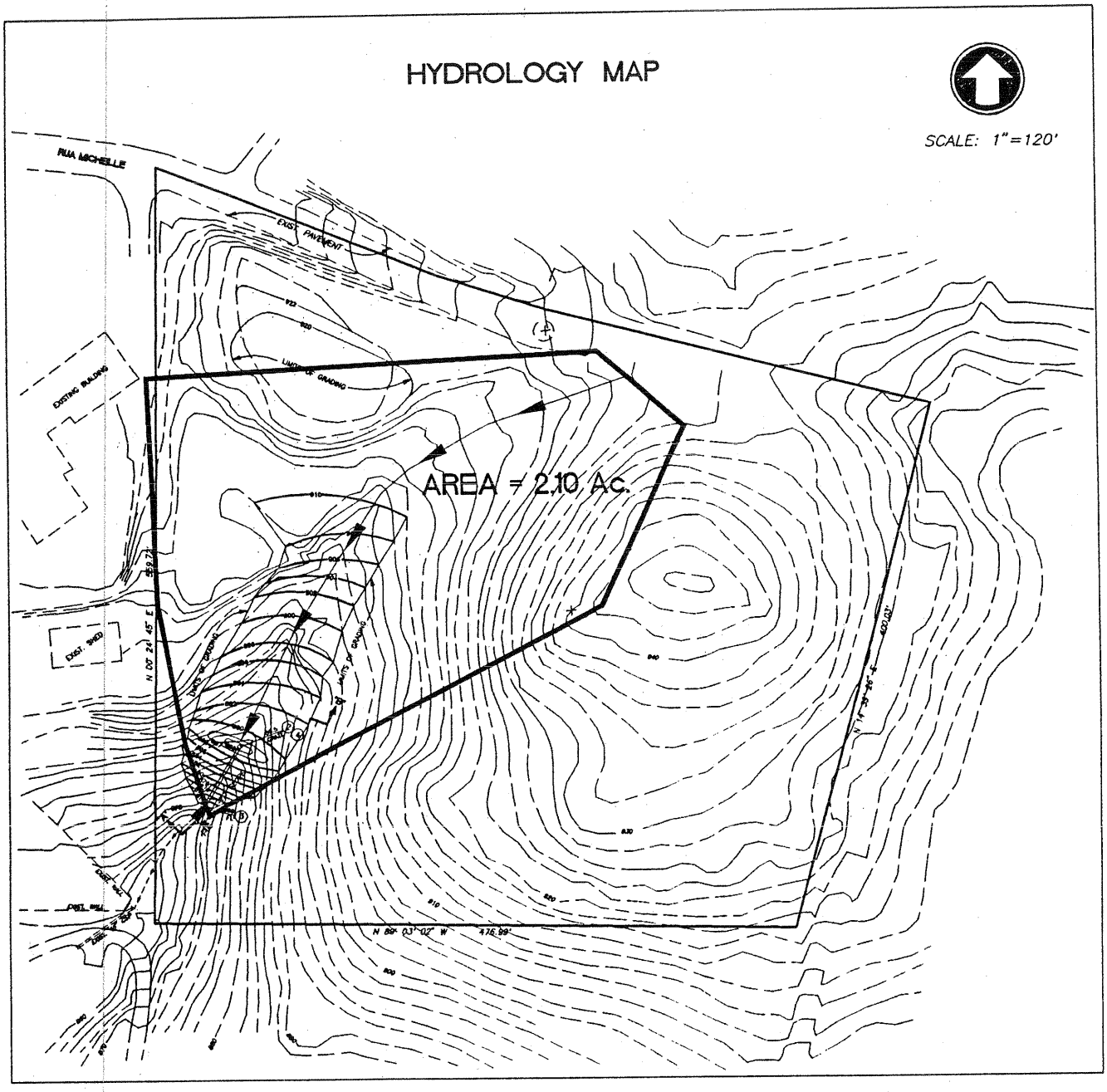
L-14349 / ER02-08-054

REGISTERED PROFESSIONAL ENGINEER
HENRY C. PODUIZ
No. C 37037
Exp. 6-30-04
CIVIL
STATE OF CALIFORNIA

10/21/02

HYDROLOGY MAP

SCALE: 1"=120'

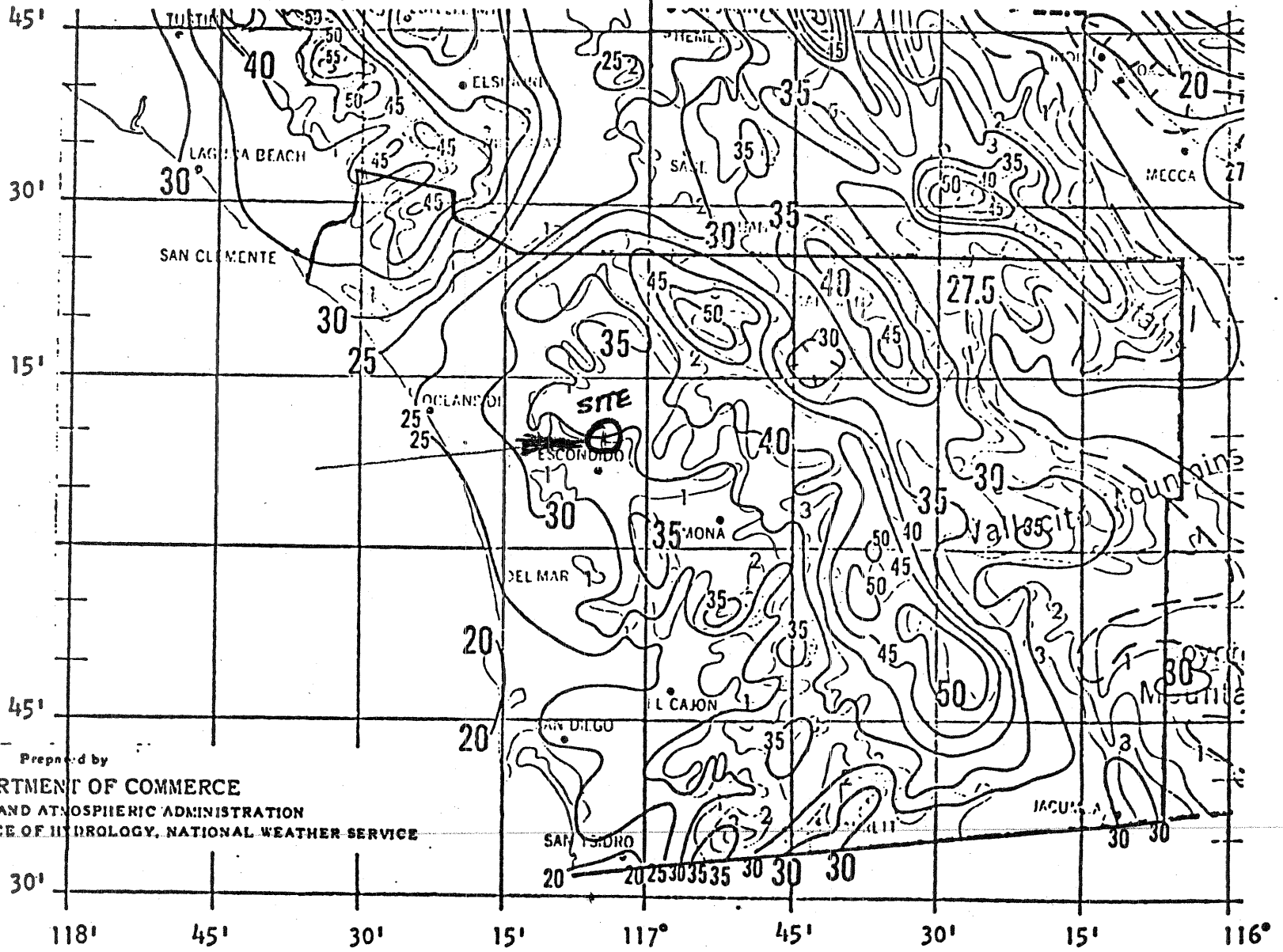


RUA MICHELLE
938.0
950
929.0
928.5
931.5
925
927.0
917.5
923.5
903.5
925
959.5
953.5
960.0
946.5
929.0
932.5
879.0
930.5
900
841.0
887.5
929.5
932.0
R2W
R2W
850
894.0
925
886.0
873.0

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 6-HOUR PRECIPITATION

⌒20⌣ ISOPLUVIALS OF 100-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH

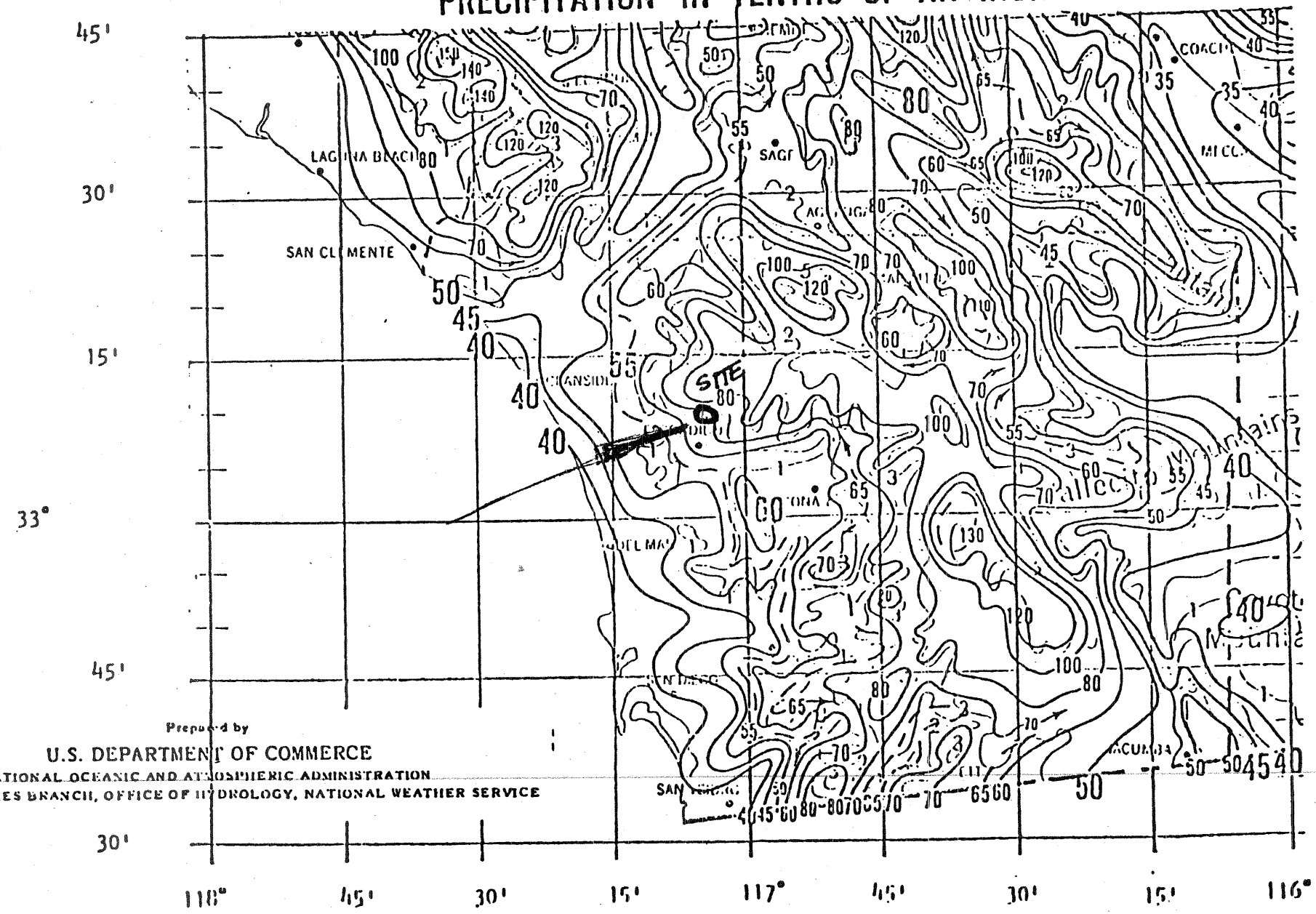


Prepared by
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, NATIONAL WEATHER SERVICE

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 24-HOUR PRECIPITATION

(20) ISOPLUVIALS OF 100-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH



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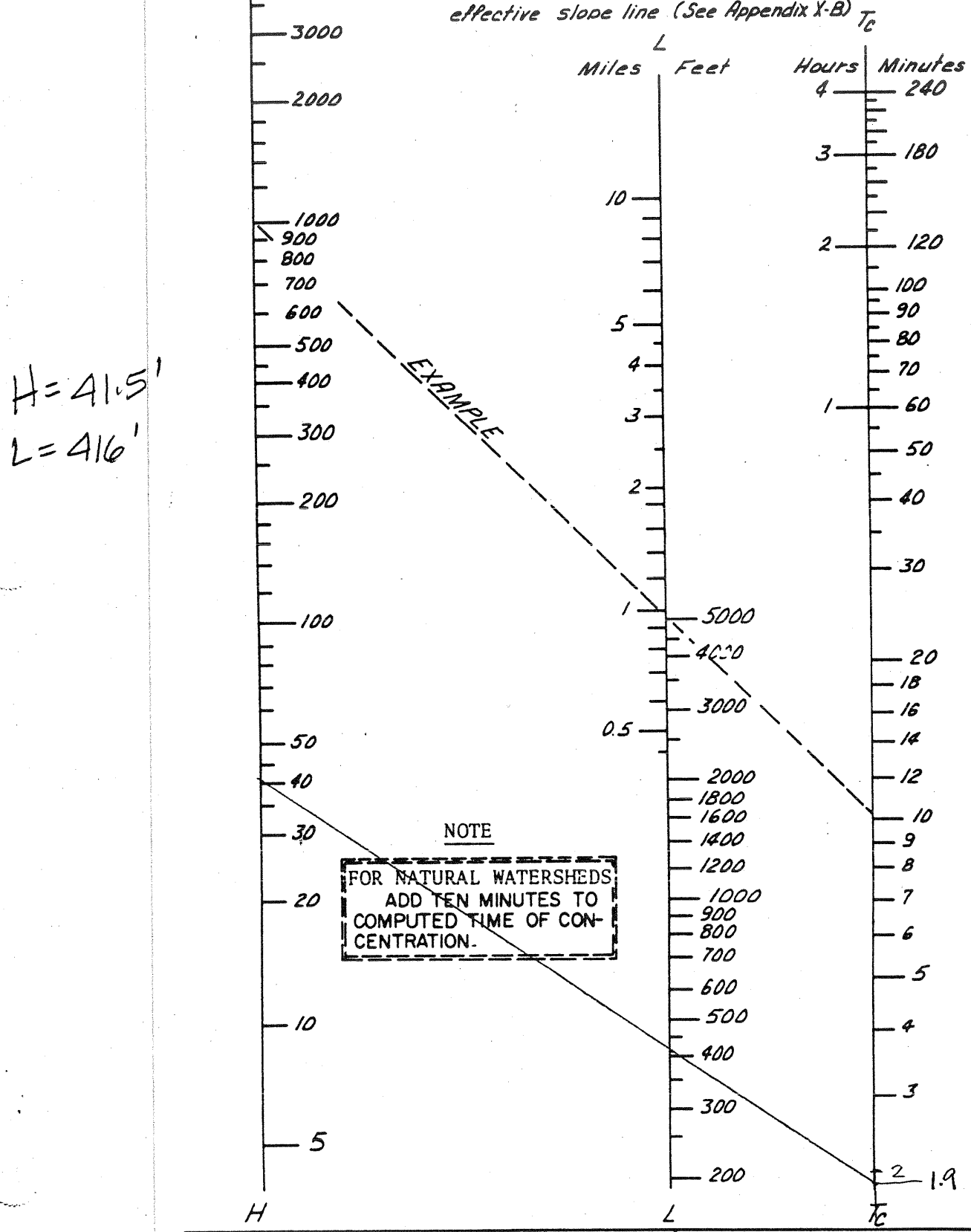
EQUATION

$$T_c = \left(\frac{11.9L^3}{H}\right)^{.385}$$

T_c = Time of concentration

L = Length of watershed

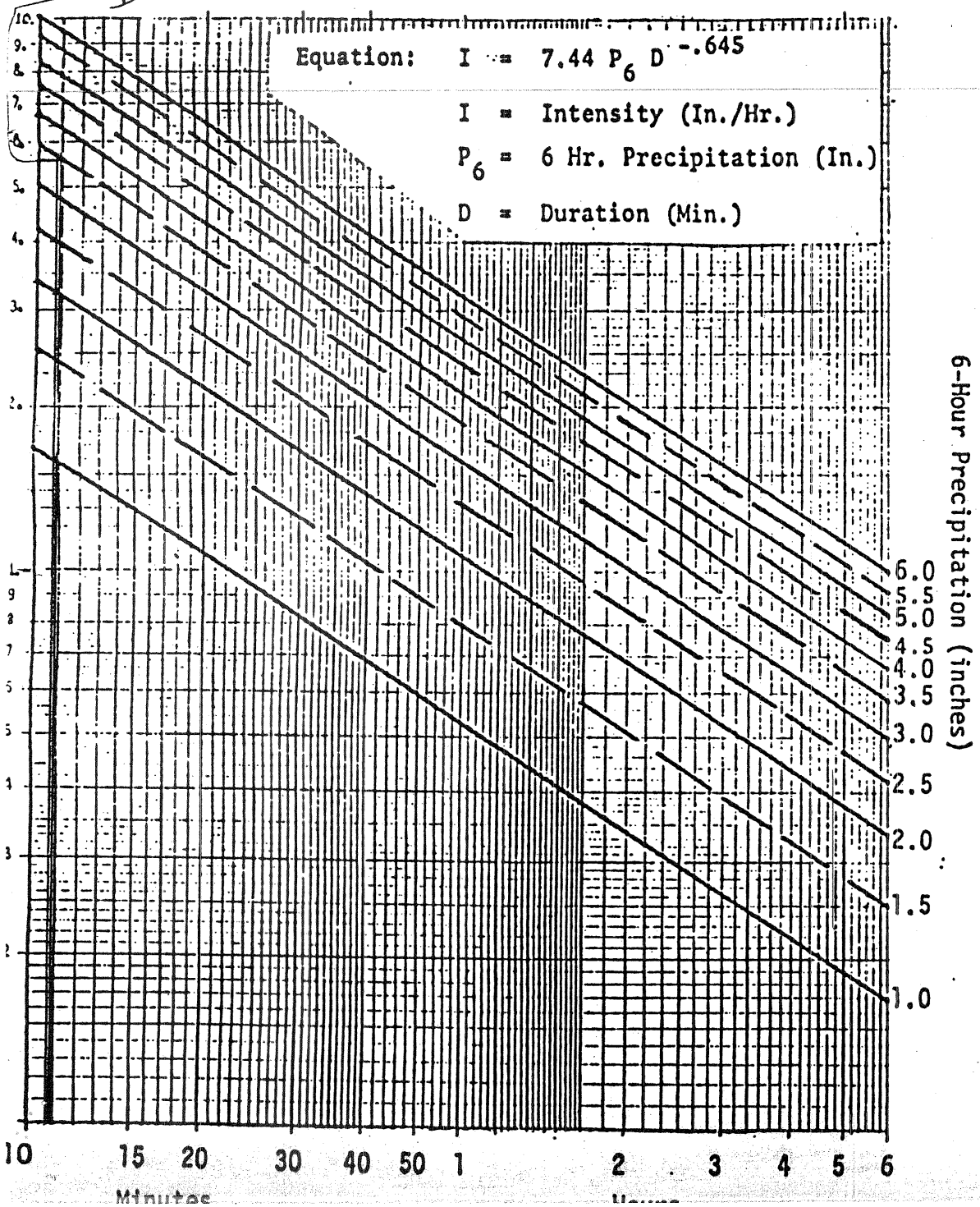
H = Difference in elevation along effective slope line (See Appendix X-B)



SAN DIEGO COUNTY DEPARTMENT OF SPECIAL DISTRICT SERVICES DESIGN MANUAL	NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (Tc) FOR NATURAL WATERSHEDS

INTENSITY-DURATIC DESIGN CHART

I = 5.27



Directions for Application:

1) From precipitation maps determine 6 hr. and 24 hr. amounts for the selected frequency. These maps are printed in the County Hydrology Manual (10, 50 and 100 yr. maps included in th 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: LAT. 33° 10' LONG. 117° 06'

0) Selected Frequency 100 yr.

1) P_6 = 3.5 in., P_{24} = 7.0, $\frac{{}^*P_6}{P_{24}}$ = 50%*

2) Adjusted $^*P_6$ = 3.5 in.

3) t_c = 11.9 min. 1.9+10

4) I = 5.27 in/hr.

*Not Applicable to Desert Region

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Group [1] A	B	C	D
Residential:				
Single Family	.40	.45	.50	.55
Multi-Units	.45	.50	.60	.70
Mobile Homes	.45	.50	.55	.65
Rural (lots greater than 1/2 acre)	.30	.35	.40	.45
Commercial [2]				
80% Impervious	.70	.75	.80	.85
Industrial [2] 90% Impervious	.80	.85	.90	.95

NOTES:

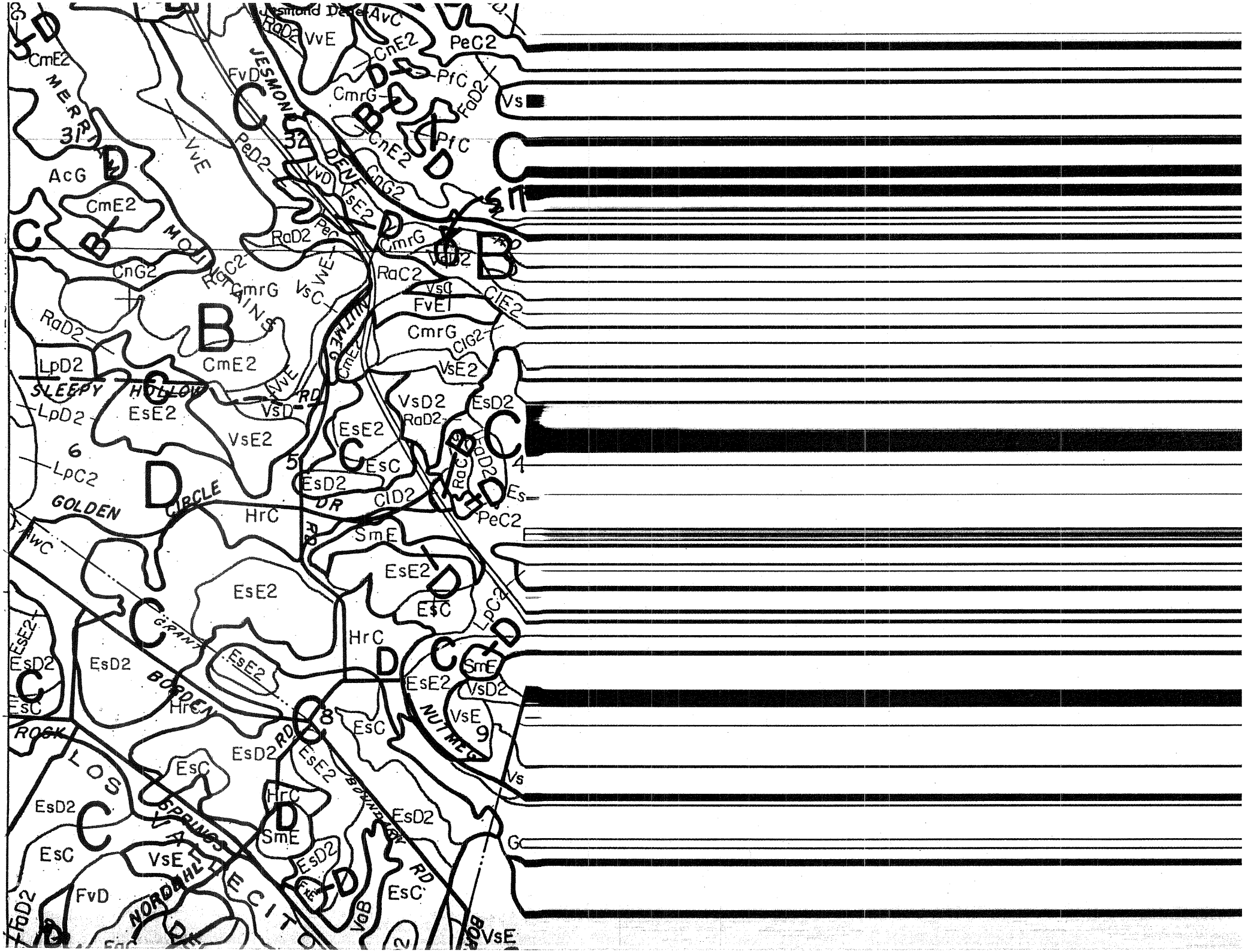
(1) Soil Group maps are available at the offices of the Department of Public Works.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil group.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

$$\text{Revised } C = \frac{50}{80} \times 0.85 = 0.53$$



Jesmond Dene
JESMOND DENE
MERRIAM
MOUNTAINS
SLEEPY HOLLOW RD
GOLDEN CIRCLE DR
GRANT
BORDEN
ROCK
LOS VALLECITOS
SPRINGS
NORDHILL
NUTMEG
BOUNDARY RD
AvC
RaD2
VvE
CnE2
PeC2
PfC
FaD2
Vs
FvD
CmrG
CnE2
PfC
CnG2
VvD
VsE2
PeD2
AcG
CmE2
RaD2
CnG2
RaC2
VsC
VvE
CmrG
RaC2
VsC
FvE1
ClE2
CmrG
ClG2
VsE2
RaD2
LpD2
CmE2
VvE
VsD
VsD2
EsD2
RaD2
EsE2
VsE2
EsE2
EsC
EsD2
ClD2
PeC2
LpC2
HrC
SmE
EsE2
EsC
LpC2
EsE2
EsD2
EsD2
EsE2
HrC
SmE
EsE2
VsD2
EsC
HrC
EsC
VsE
EsD2
EsE2
EsC
HrC
EsD2
SmE
EsD2
EsC
VsE
FvD
EsD2
EsC
VaB
VsE

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MERRIMAC
MOUNTAINS
SLEEPY HOLLOW RD
GOLDEN CIRCLE DR
NUTMEG RD
IRIS RD
RINCON AVE
VISTA AVE
NORTH ASH
HILL ST AVE
ASH AVE
MIDWAY
GRANT
BORDEN RD
ROCK
LOS VALLECITOS
SPRINGS
NORDHILL
BOUNDARY RD
BROADWAY
RINCON
BASE

HP Engineering, Inc.
Civil Engineering - Land Surveying
1465 Crestview Road
Redlands, California
(909) 799-6796, Fax (909) 799-1508

Hydrology Analysis:

There are no changes in flow pattern, tributary area, ground cover and usage. The only change was picking up the run-off into a catch basin into a pipe then into the existing flood flow area.

Q = C I A

C = 0.35 (Soil Group B, Rural lots greater than 1/2 acre)
I = 5.6
A = 2.1 Ac.

Q100 = 0.35 x 5.6 x 2.1 = 3.87 CFS

HP Engineering, Inc.
Civil Engineering - Land Surveying
11446 Via Rio
Loma Linda, California
(909) 799-6796, Fax (909) 799-1508

```
                Inside Diameter
                  ( 16.00 in.)

                      *
                  *         *
               *               *

             *                   *
             ^^^^^^^^^^^^^^^^^^^^^_ _ _ _
            *        Water        *     |
                                         |
            *                    *     |
                                         |
             *                   *  (  5.91 in.)
                                    ( 0.493 ft.)
               *               *         |
                  *         *           |
                      *_ _ _ _ _ _ _ _ v_
```

Circular Channel Section

Flowrate	3.870	CFS
Velocity	8.254	fps
Pipe Diameter	16.000	inches
Depth of Flow	5.914	inches
Depth of Flow	0.493	feet
Critical Depth	0.781	feet
Depth/Diameter (D/d)	0.370	
Slope of Pipe	3.000	%
X-Sectional Area	0.469	sq. ft.
Wetted Perimeter	1.743	feet
AR^(2/3)	0.195	
Mannings 'n'	0.013	
Min. Fric. Slope, 16 inch Pipe Flowing Full	0.255	%