CEQA PRELIMINARY HYDROLOGY/HYDRAULIC STUDY
FOR
TPM 20675

Prepared by

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For

Alfred Dart
Ribbonwood Road
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September 25, 2003

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SDC DPLU RCVD 5-30-06

TPM20675RPL[1]

Introduction:

The 33.5 acre site is located in the Boulevard Area, on the east side of Ribbonwood Road. The site is to be divided from one parcel into three parcels of roughly equal size. The proposed parcels will be developed with single family dwellings.

Drainage Patterns:

The development will not substantially alter the existing drainage patterns that would result in substantial erosion or siltation. Following construction, the site retains 99% of the natural slope.

There are to be no rivers or streams affected by construction. The development is located at the top of a hill.

Flow Calculation for the Existing Site:

Drainage Area:

The drainage area is three segments. For details of the drainage areas, see the attached drainage area map.

Drainage Area A will drain towards the northeast, and follow natural flow down the hillside.

$Area_A$ = 24.3 acres

Drainage Area B will drain towards the southeast of the property, and follow natural flow down the hillside.

$Area_B$ = 3.6 acres

Drainage Area C will drain towards the southwest, and flow into Ribbonwood Dr.

$Area_C$ = 5.6 acres

Coefficient of Runoff:

The coefficient is based on soil type B, soils having a medium infiltration rate when wetted, and the location, a residential area with 1 DU/acre. See sheet 5 for the soil map and sheet 6 for the Coefficient Table.

Coefficient = 0.32

Time of Concentration:

$Tc = 60[(11.9)*(L)^3/(H)]^{0.385}$

L = length in miles

H = equal to change in elevation in feet

See attached Drainage Map maps for the drainage area and the path for the time of concentration.

For $Area_A$: L = 1135 ft = 0.214 miles
H = 50 ft
$Tc = 60[(11.9)*(0.214)^3/(50)]^{0.385}$ = equal to about 6.0 minutes
For natural watersheds, add 10 minutes, 6.0 +10 = 16.0 minutes

For $Area_B$: L = 450 ft = 0.085 miles
H = 30 ft
$Tc = 60[(11.9)*(0.085)^3/(30)]^{0.385}$ = equal to about 2.5 minutes
For natural watersheds, add 10 minutes, 2.5 +10 = 12.5 minutes

For $Area_C$: L = 520 ft = 0.098 miles
H = 35 ft
$Tc = 60[(11.9)*(0.098)^3/(35)]^{0.385}$ = equal to about 2.5 minutes
For natural watersheds, add 10 minutes, 2.5 +10 = 12.5 minutes

Intensity:

$I = (7.44)*(P_6)*D^{-0.645}$

The intensity is based upon the 100-year, six-hour precipitation(sheets 8, 9, and 10), and the Time of Concentration.

For $Area_A$: $I = (7.44)*(3.0)*(16.0)^{-0.645} = 3.7$ in/hr

For $Area_B$: $I = (7.44)*(3.0)*(12.5)^{-0.645} = 4.4$ in/hr

For $Area_C$: $I = (7.44)*(3.0)*(12.5)^{-0.645} = 4.4$ in/hr

Flow:

Flow for $Area_A$: Q = CIA = (0.32)(3.7)(24.3) = 28.8 cfs

Flow for $Area_B$: Q = CIA = (0.32)(4.4)(3.6) = 5.1 cfs

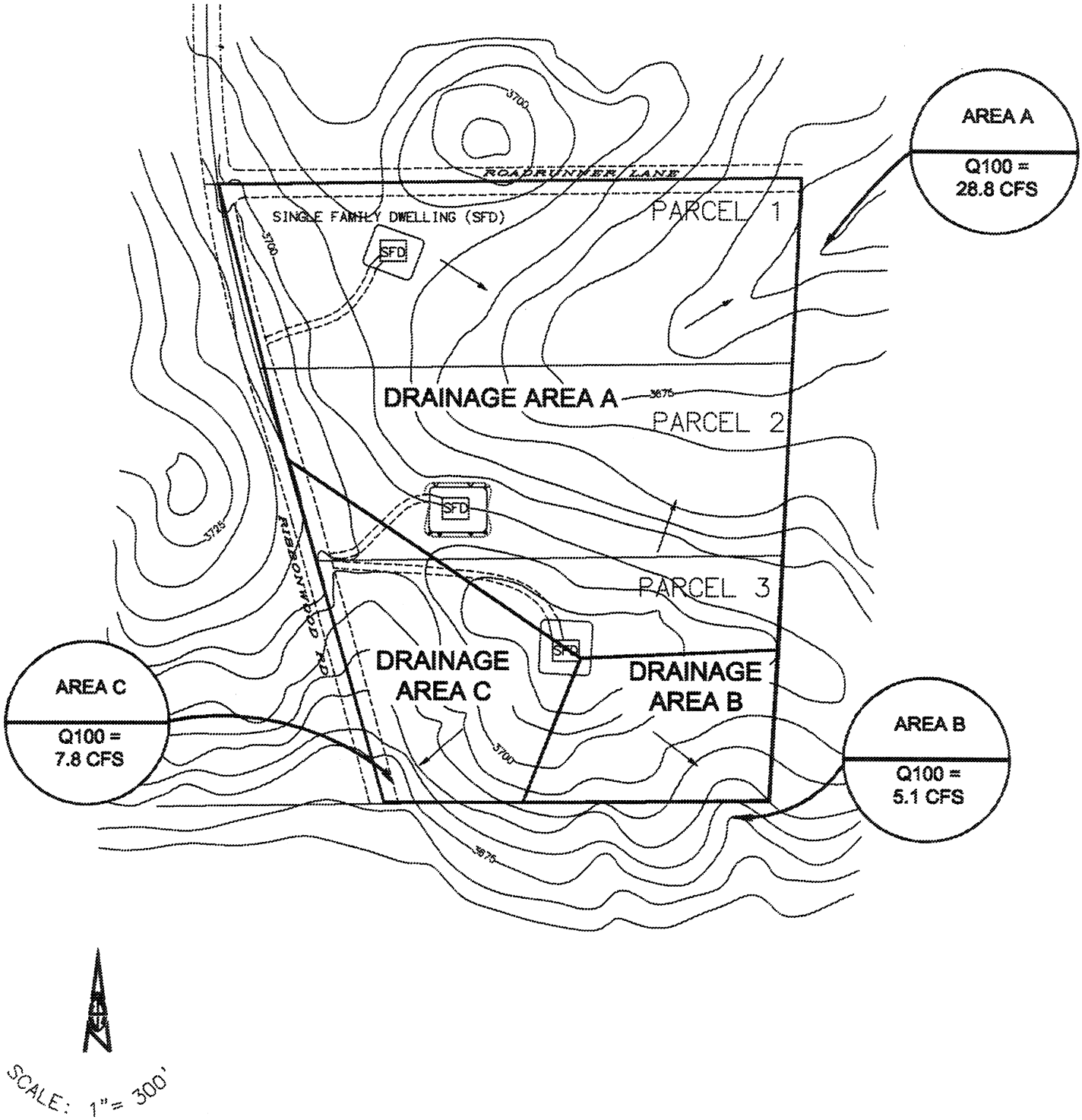
Flow for $Area_C$: Q = CIA = (0.32)(4.4)(5.6) = 7.8 cfs

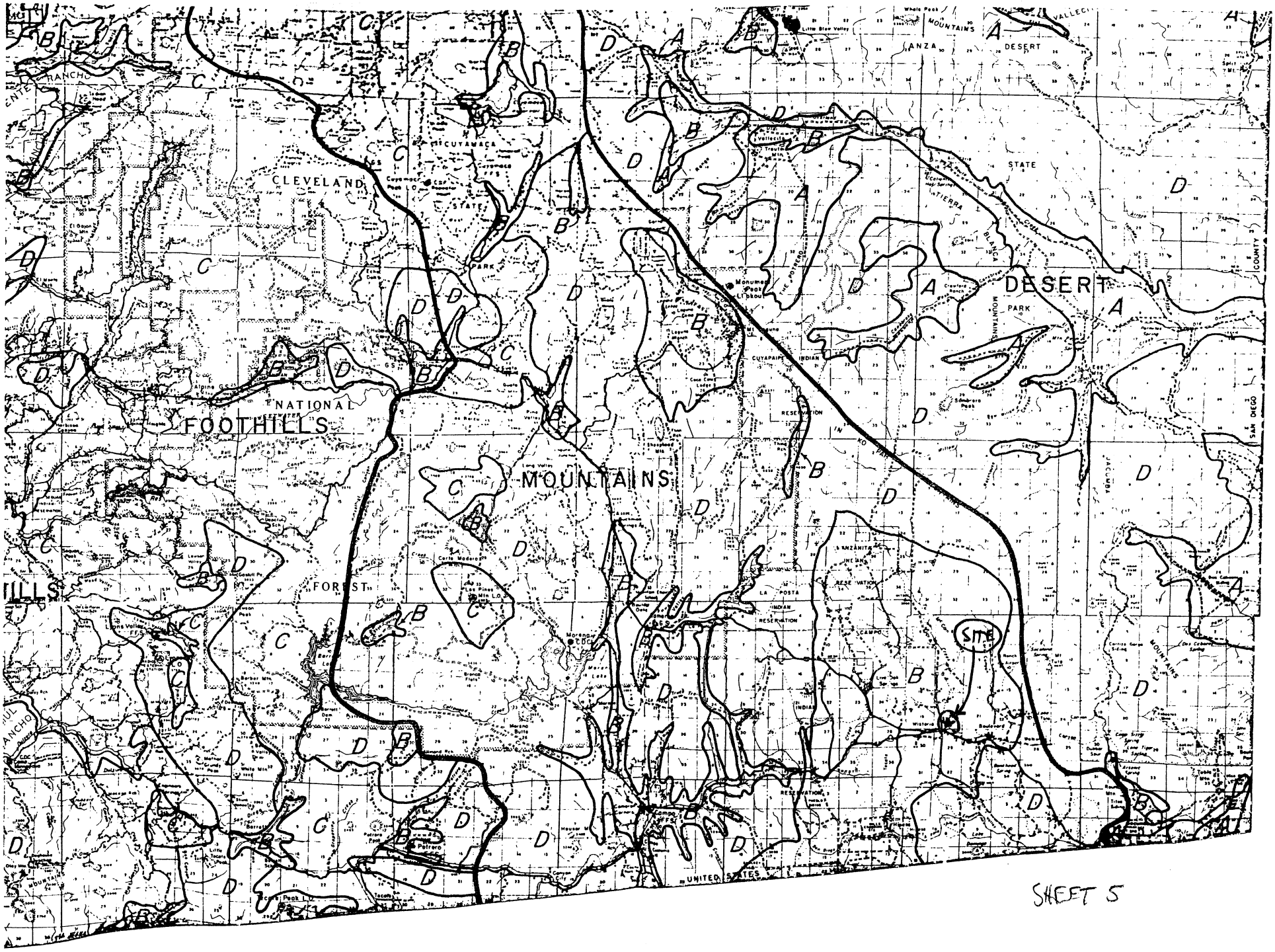
Total Flow Q_{100} = 28.8 + 5.1 + 7.8 = 41.7 cfs

Effects of Development

The proposed development of the site will not effect the 100-year flow. Following construction, the site retains 99% of its natural grading. Houses and driveways account for approximately 2% of the surface area, so there is no real change in impervious area. Therefore the change in flow is negligible and the post-development flow is 41.7 cfs.

DRAINAGE MAP




CLEVELAND
NATIONAL
FOOTHILLS
MOUNTAINS
FOREST
DESERT
STATE
PARK
SITE
UNITED STATES

SHEET 5

SHEET 6

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	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial	General Industrial	95	0.95 87	0.95 87	0.95 87	0.95 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).

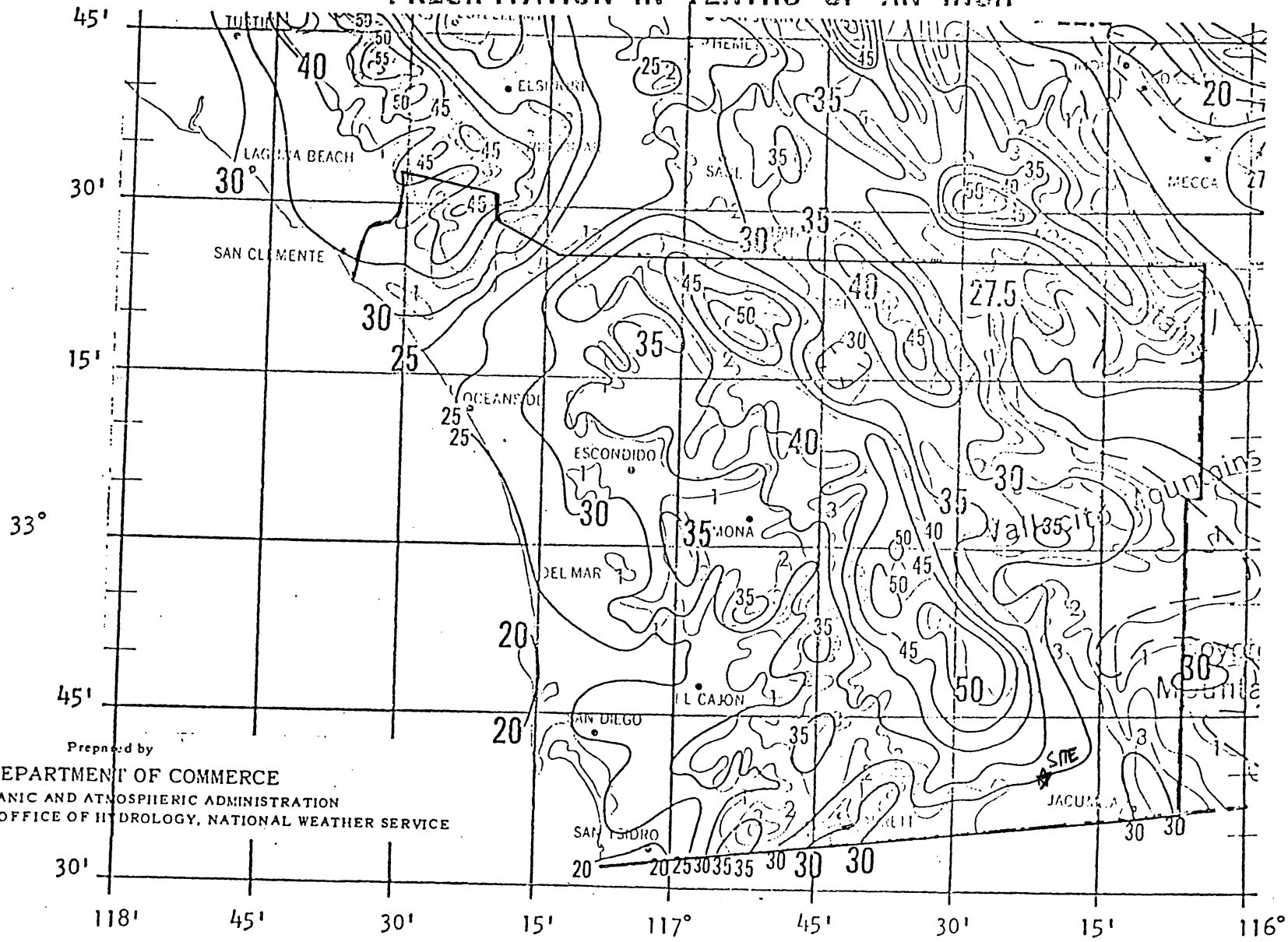
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 6-HOUR PRECIPITATION

SHEET 7

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



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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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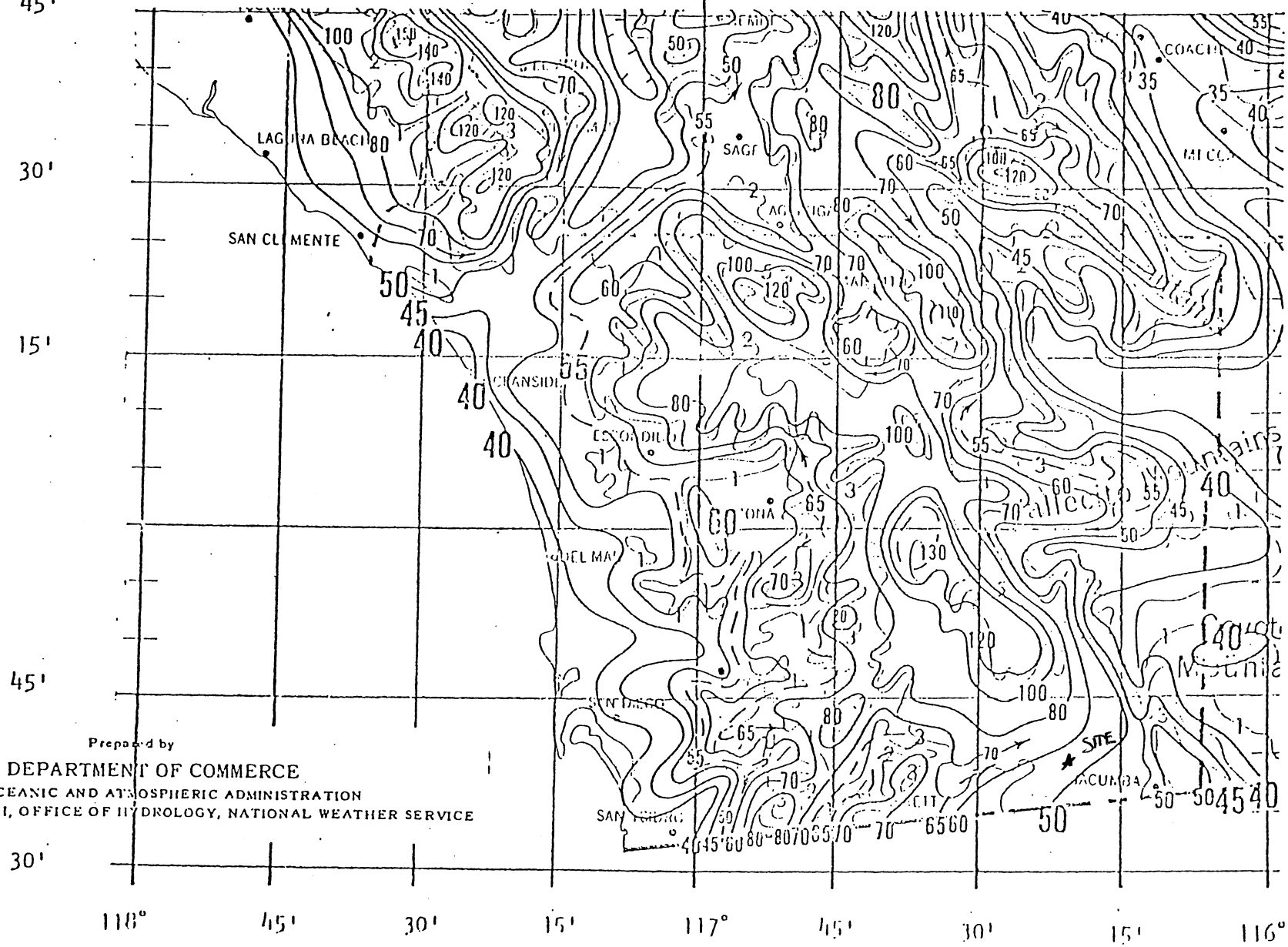
COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 24-HOUR PRECIPITATION

SHEET 8

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



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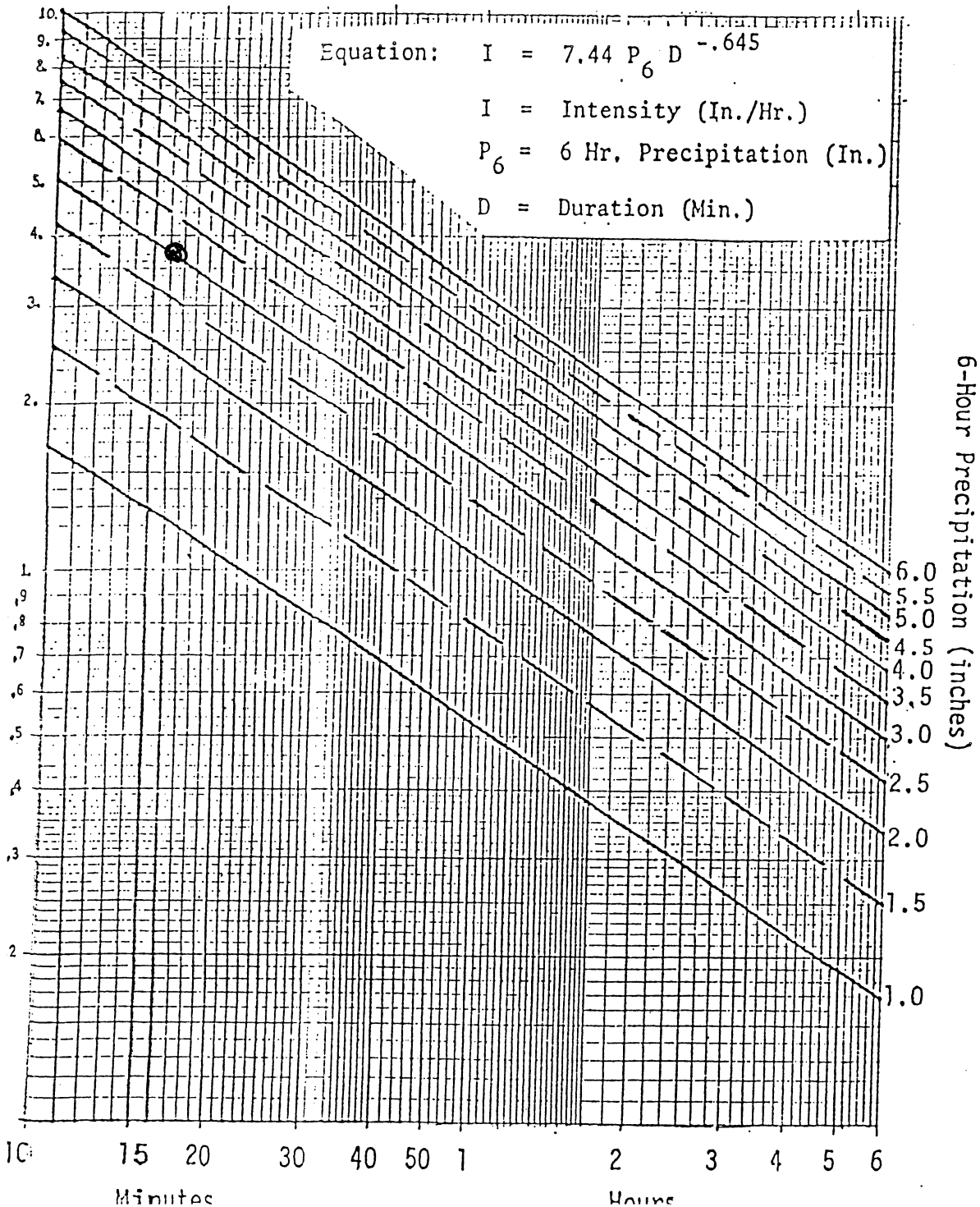
INTENSITY-DURATI... DESIGN CHART

SHEET 9



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 Hydrolo Manual (10, 50 and 100 yr. maps included in 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 th plotted lines.

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

Application Form:

0) Selected Frequency 100 yr.

1) P_6 = 30 in., P_{24} = 5.5, $\frac{{}^*P_6}{P_{24}}$ = 55 %*

2) Adjusted $^*P_6$ = 3.0 in.

3) t_c = 16 min.

4) I = 3.7 in/hr.

*Not Applicable to Desert Region