

Appendix D – Tables and Figures

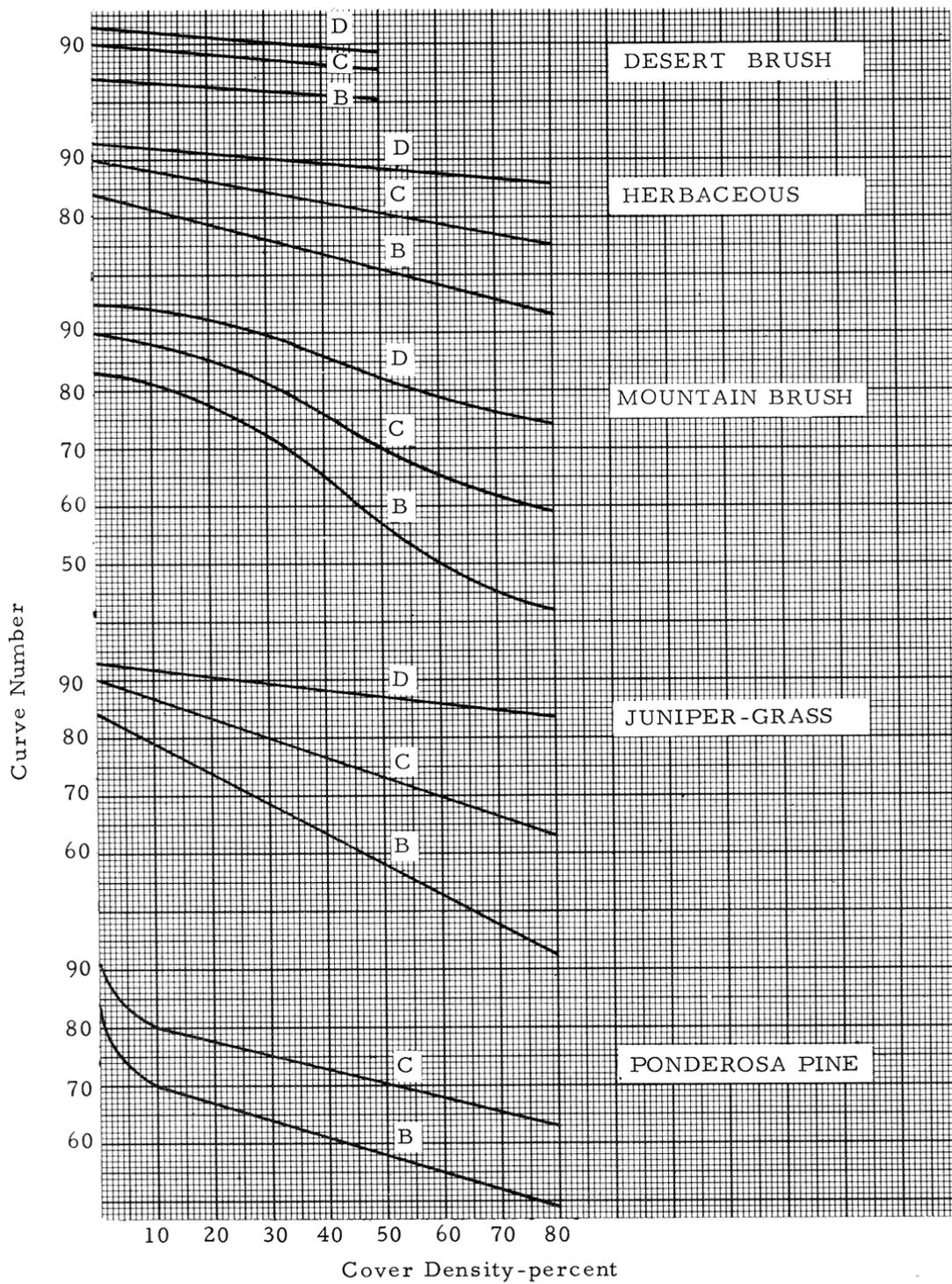
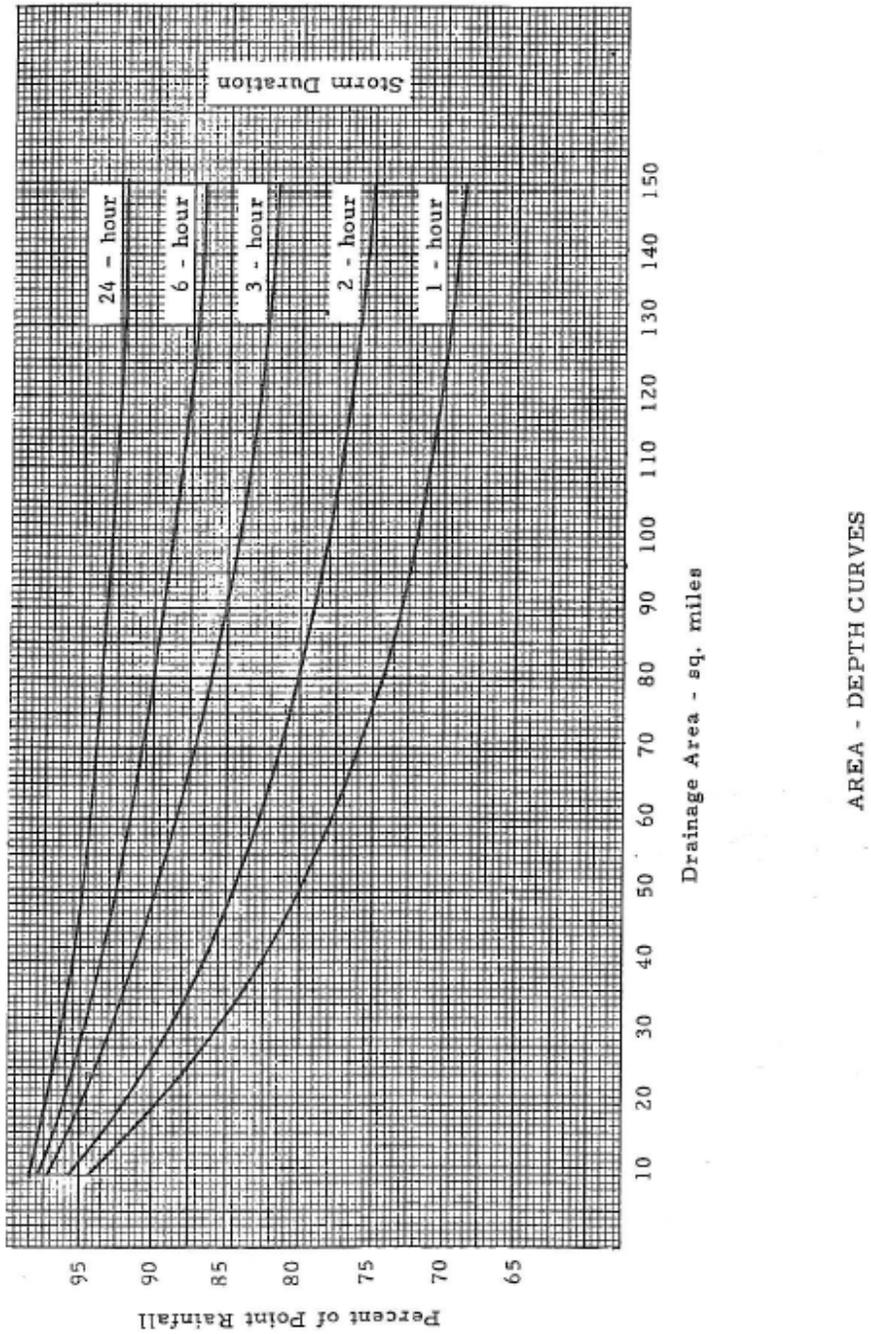


Figure D-1. Hydrologic Soil-Cover Complexes and their Associated SCS Curve Numbers



Weather Bureau
 Technical Paper No. 40

Figure D-2. Aerial Reduction for Watersheds Larger Than Ten Square Miles (modification of Weather Bureau Technical Paper 40)

Table D-1. Summary of SCS Curve Numbers for Desert Brush

Hydrologic Soil Types	Vegetative Cover Density			
	10%	20%	30%	40%
Types A and B	85	83	82	81
Type C	89	88	87	86
Type D	92	91	90	89

Table D-2. Summary of SCS Curve Numbers for Urban Lawns

Hydrologic Soil Types	Vegetative Cover Density		
	Poor < 30% Coverage	Average 30% to 60% Coverage	Excellent > 60% Coverage
Types A and B	83	79	74
Type C	88	86	83
Type D	91	90	87

Table D-3. Summary of Approximate Impervious Cover Percentages for Various Land Development Types

Development Type		Impervious Cover Percentage		
		Minimum	Average	Maximum
Rural and Suburban:				
a.	Less than 1 house/acre	5 %	10 %	20 %
b.	1 house/acre	15 %	20 %	25 %
c.	2 houses/acre	25 %	30 %	35 %
Light to Moderate Urbanization:				
a.	3 houses/acre	30 %	35 %	40 %
b.	4 houses/acre (detached)	35 %	40 %	45 %
c.	5 houses/acre (detached)	45 %	50 %	55 %
Highly Urbanized:				
a.	Multiple Dwellings, 4 units/acre or more	50 %	65 %	90 %
c.	Light Industrial and Commercial	50 %	65 %-75%	80 %
d.	Heavy Industrial and Commercial	80 %	85 %-95 %	100%

Table D-4. Values of R1 and R2 for a Selected Range of Curve Numbers from 95 to 60

CN	R1	R2	CN	R1	R2
95	98.67	80.08	75	88.50	58.08
94	98.33	78.76	74	88.00	56.76
93	98.00	77.44	73	87.00	55.88
92	97.50	76.12	72	86.50	55.00
91	97.00	75.24	71	86.00	54.12
90	96.50	73.92	70	85.00	53.24
89	96.00	72.60	69	84.50	52.36
88	95.50	71.72	68	84.00	51.04
87	95.00	70.40	67	83.00	50.16
86	94.50	69.52	66	82.50	49.28
85	94.00	68.20	65	82.00	48.40
84	93.50	66.88	64	81.00	47.52
83	93.00	66.00	63	80.00	46.64
82	92.50	65.12	62	79.00	45.76
81	92.00	63.80	61	78.50	44.88
80	91.50	62.92	60	78.00	44.00
79	91.00	62.04			
78	90.00	60.72			
77	89.50	59.84			
76	89.00	58.96			

Table D-5 Basin Factors for Undeveloped or Developed Areas with No Drainage Improvements

Watershed Type*	Mean Slope (ft/ft)	n _b (minimum)	n _b (normal)	n _b (maximum)
Mountain	> 0.03	0.040	0.050	0.060
Foothills	0.01 to 0.04	0.030	0.035	0.040
Valley	< 0.01	0.027	0.030 to 0.040	0.050

Table D-6 Basin Factors for Developed Areas with Drainage Improvements (excluding areas of shallow sheet flow)

Watershed Type*	Development Density	n _b (minimum)	n _b (normal)	n _b (maximum)
Suburban-Foothills	< 1 house/acre	0.029	0.034	0.038
Suburban-Valley	< 1 house/acre	0.027	0.029 to 0.038	0.047
Suburban-Foothills	1-2 houses/acre	0.028	0.032	0.036
Suburban-Valley	1-2 houses/acre	0.026	0.028 to 0.036	0.045
Light to Moderate Urban	3-5 houses/acre (detached)	0.020	0.022	0.025
Highly Urbanized	Apartments to Light Commercial	0.018	0.020	0.022
Commercial and Industrial	Heavy Commercial and Industrial	0.015	0.018	0.020

Table D-7 Basin Factors for Shallow Sheetflow and Overland Flow Areas

Watershed Type*	Watershed Condition	n_b
Paved	all	0.040
Paved and Natural	Suburban	0.060
	Light Urban	0.055
	Moderately Urban	0.050
Natural	Rough	0.080
	Normal	0.070
	Smooth	0.060

*Explanatory Notes:

Mountain: mostly undeveloped and are relatively rugged, narrow, and have sharp edges. Similarly, these areas often have relatively steep canyons through which watercourses meander around sharp bends, over large boulders, and through frequent debris obstructions. The ground cover in mountain areas, excluding occasional small areas with rock outcrops, usually includes numerous trees and considerable underbrush. In addition, there are no significant drainage improvements in undeveloped Mountain Areas.

Foothill: mostly undeveloped, and often have rolling terrain with rounded ridges and moderate side slopes. Watercourses typically follow relatively straight, unimproved channels, with some boulders and occasional lodged debris. Ground cover usually includes scattered brush and grasses. In addition, there are no significant drainage improvements in undeveloped Foothill Areas.

Valley: mostly undeveloped, and often have comparatively uniform, gentle slopes, as well as surface characteristics in which well defined channelization does not occur. Ground cover usually includes grasses, small shrubs, cacti, and similar desert vegetation. In addition, there are no significant drainage improvements in undeveloped Valley Areas.

Suburban: low- to moderate-density developments comprised of detached family homes or light commercial and industrial uses, and often have relatively uniform, gentle

slopes with only some watercourses that are either improved or follow paved streets.

Light to Moderate Urban: usually have multiple residential dwellings, or moderate industrial and light commercial uses. These areas are similar to Suburban Areas, but with most watercourses being either improved or following paved streets.

Highly Urbanized: similar to Light to Moderate Urban Areas, but with a large percentage of the area impervious, and virtually all watercourses are either improved or follow paved streets.

Commercial: similar to Highly Urbanized area, but less than 15% of the area remains pervious.

Overland Flow and Shallow Sheetflow: typically have extremely uniform, flat slopes with no natural or constructed channels. Surface flows do not exceed 0.5 feet in depth. Overland flow occurs at the upper reaches of a watershed where the flow is not channelized, within minor watersheds, or over relatively short distances. Along natural surfaces, ground cover may consist of cultivated crops or substantial growth of grass and fairly dense, small shrubs, cacti or similar desert vegetation. Generally, no drainage improvements exist in these areas. This basin factor is not appropriate for use in watersheds dominated by paved surfaces. It is to be applied in undeveloped, natural areas where shallow sheetflow rather than channelized flow predominates. *The user shall provide justification for selecting these Basin Factors with any subsequent drainage analysis submitted to the PRCFCD for review or approval.*

Basin Factors shall be selected for future, fully developed conditions, based on the best available information regarding future land use potential. When calculating flood peaks using PC-HYDRO, the user shall describe this future land use, and the published source from which this information or projection was obtained.

Basin Factors for watersheds or subwatersheds that are not homogeneous shall be identified, and the proportion of each watershed and development type quantified. From this information, an area-weighted average Basin Factor shall be calculated and then used.

Table D-8 Approximate Ratios of Lesser Magnitude Floods to the 100-Year Flood

Watershed Development	2-Year	10-Year	25-Year	50-Year
Rural	0.10	0.35	0.55	0.75
Suburban	0.15	0.40	0.60	0.80
Moderately Urban	0.20	0.45	0.65	0.85
Highly Urban	0.25	0.50	0.70	0.85