
100-YEAR 1-HOUR RAINFALL (INCHES)
GULF OF MEXICO

25-YEAR 1-HOUR RAINFALL (INCHES)

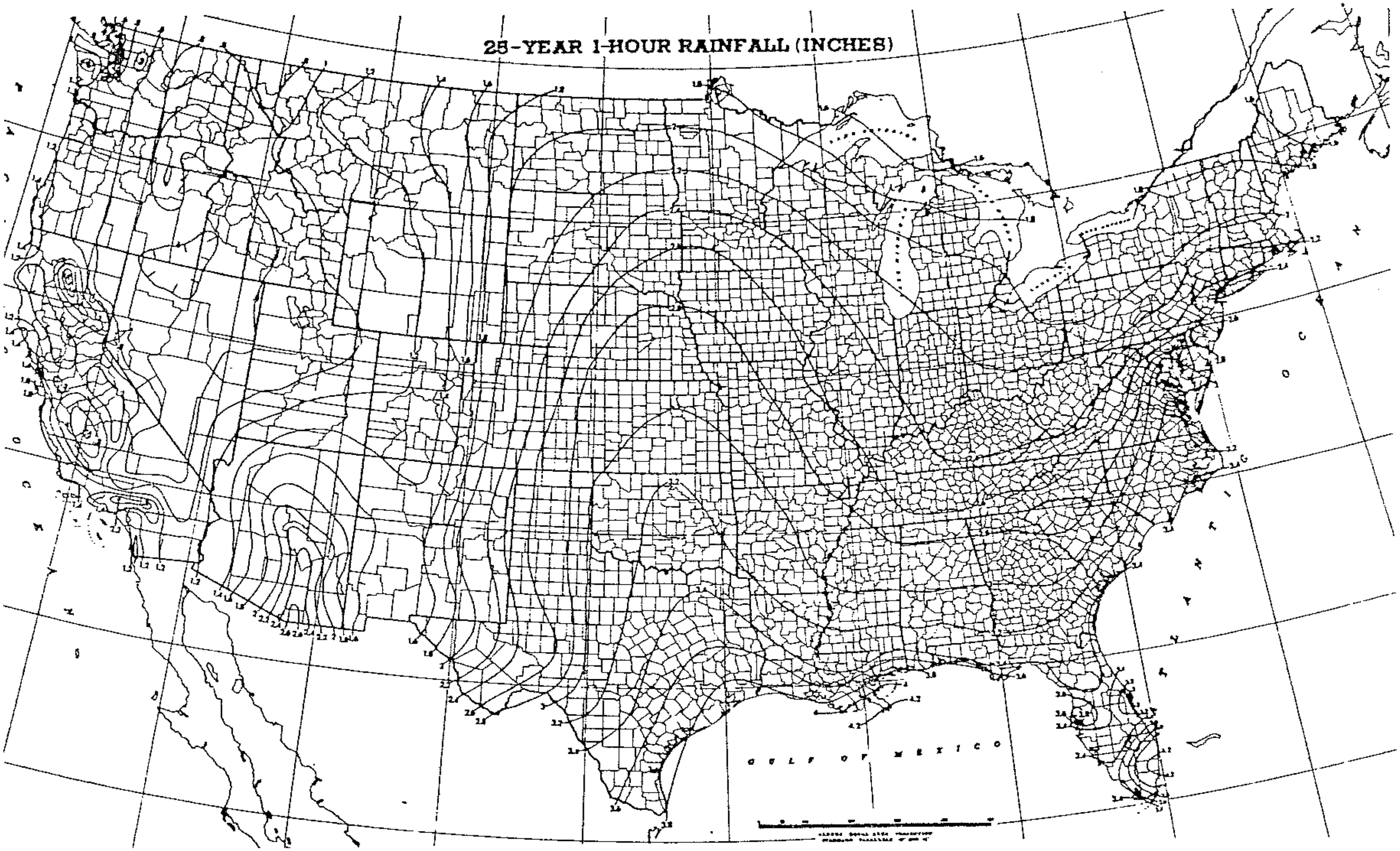

Table 3-2: Description of NRCS soil classifications

Group	Description	Min. infiltration (in/hr)
A	Deep sand; deep loess; aggregated silts	0.30 – 0.45
B	Shallow loess; sandy loam	0.15 – 0.30
C	Clay loams; shallow sandy loam; soils low in organic content; soils usually high in clay	0.05 – 0.15
D	Soils that swell significantly when wet; heavy plastic clays; certain saline soils	0 – 0.05

Source: SCS (1985)

Table 3-3: Runoff curve numbers for urban land uses

Land use description	Soil group			
	A	B	C	D
Lawns, open spaces, parks, golf courses:				
Good condition: grass cover on 75% or more of area	39	61	74	80
Fair condition: grass cover on 50% to 75% of area	49	69	79	84
Poor condition: grass cover on 50% or less of area	68	79	86	89
Paved parking lots, roofs, driveways, etc	98	98	98	98
Streets and roads:				
Paved with curbs and storm sewers	98	98	98	98
Gravel	76	85	89	91
Dirt	72	82	87	89
Paved with open ditches	83	89	92	93
Commercial and business areas (85% impervious)	89	92	94	95
Industrial districts (72% impervious)	81	88	91	93
Row houses, town houses and residential with lot sizes of 1/8 ac or less (65% impervious)	77	85	90	92
Residential average lot size:				
1/4 ac (38% impervious)	61	75	83	87
1/3 ac (30% impervious)	57	72	81	86
1/2 ac (25% impervious)	54	70	80	85
1 ac (20% impervious)	51	68	79	84
2 ac (12% impervious)	46	65	77	82
Developing urban area (newly graded; no vegetation)	77	86	91	94

Source: SCS (1985)

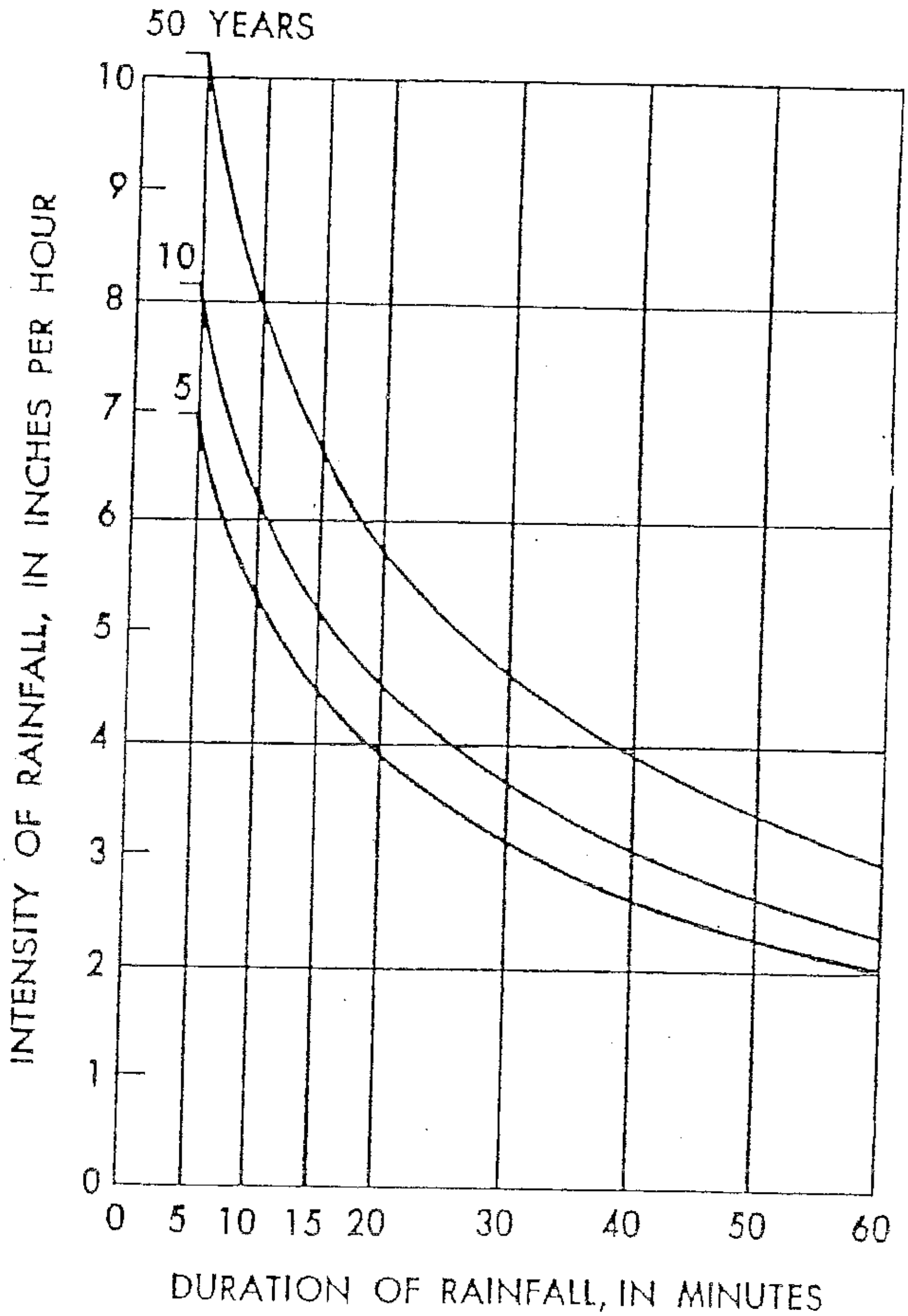

Figure II-12.—Intensity curves for storms in the vicinity of Cairo, Illinois.

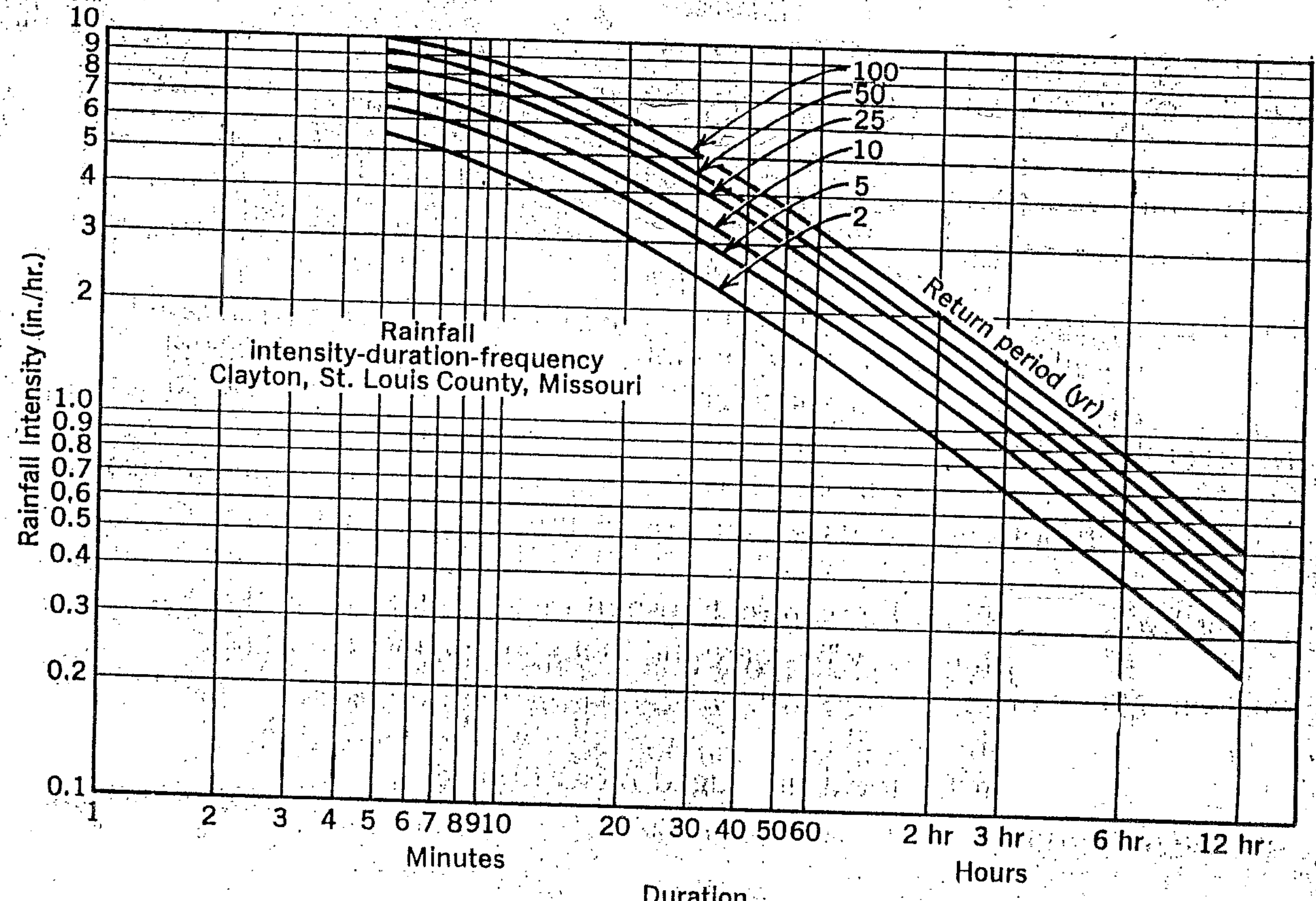

Fig. 11–2. A typical rainfall intensity, duration, frequency curve. (Source: *Design of Urban Highway Drainage*, FHWA.)

Table 2-3: Formulas for computing time of concentration

Method	Formula	Comments
Kirpich (1940)	$t_c = 0.0078L^{0.77}S^{-0.385}$	For overland flow on concrete or asphalt, multiply t_c by 0.4; for concrete channels, multiply by 0.2
Izzard (1946)	$t_c = \dfrac{41.025(0.0007i + c)L^{1/3}}{S^{1/3}i^{2/3}}$	Retardance factor, c, ranges from 0.007 for smooth pavement to 0.012 for concrete and to 0.06 for dense turf; for $iL < 500$
FAA (1970)	$t_c = \dfrac{0.39(1.1 - C)L^{1/2}}{S^{1/3}}$	Runoff coefficient, C, from Table 2-2
Kinematic wave (Morgali and Linsley, 1965; Aron and Erborge, 1973)	$t_c = \dfrac{0.938L^{0.6}n^{0.6}}{i^{0.4}S^{0.3}}$	Manning roughness coefficient, n, found from Table 2-4
NRCS upland method (SCS, 1986)	$t_c = \dfrac{1}{60}\sum_{j=1}^{N}(L_j/V_j)$	For shallow concentrated or channel flow, average velocity, V, in segment j can be computed via Mannings equation; for overland flow, see NRCS charts (SCS, 1986) plotting V as a function of surface cover and slope
NRSC lag equation (SCS, 1986)	$t_c = \dfrac{100L^{0.8}[(1000/CN) - 9]^{0.7}}{19000S^{1/2}}$	Curve number, CN, is from Table 2-7
Yen and Chow (1983)	$t_c = K_Y\left(\dfrac{NL}{S^{1/2}}\right)^{0.6}$	K_Y ranges from 1.5 for light rain ($i < 0.8$) to 1.1 for moderate rain ($0.8 < i < 1.2$), and to 0.7 for heavy rain ($i > 1.2$); overland texture factor, N, in Table 2-5

Note: t_c is evaluated in minutes; L is length of the flow path in ft; i is rainfall intensity in in/hr; and S is average slope in ft/ft.