

**Example 8.9**

A unit hydrograph (U.H.) for a 182 km<sup>2</sup> watershed in Dallas County, Texas, for a rainfall duration of 2 hours was developed in Example 8.8. A design storm for Dallas County for a recurrence interval of 50 years was developed in Example 7.11. The direct runoff depth associated with each 2-hour increment of rainfall was determined in Example 8.5. Combine the information developed in these previous examples, following the procedure outlined in Fig. 8.10, to develop a 50-year recurrence interval flood hydrograph.

**Solution** The 2-hour unit (1.0 cm) hydrograph from Example 8.8 is reproduced in columns 1 and 2 of the following table. The direct runoff volume from Example 8.5, in cm, for each of the 2-hour increments of rainfall included in the 50-year design storm is reproduced across the top of columns 3–12. The incremental hydrographs in these columns are computed by multiplying the unit hydrograph ordinates by the runoff volume. The total storm hydrograph in column 13 is the summation of columns 3–12.

Time (hrs)	U.H. (m <sup>3</sup> /s)/cm	Hydrographs (m <sup>3</sup> /s) for each increment of runoff volume (cm)										Hydrograph (m <sup>3</sup> /s)
		0.04	0.24	0.70	9.70	2.27	1.10	0.76	0.60	0.50	0.43	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
0	0.0	0.0										0.0
1	32.6	1.3										1.3
2	83.2	3.3	0.0									3.3
3	109.4	4.4	7.8									12.2
4	97.6	3.9	20.0	0.0								23.9
5	66.4	2.7	26.3	22.8								51.7
6	46.0	1.8	23.4	58.2	0.0							83.5
7	30.8	1.2	15.9	76.6	316.2							410
8	17.8	0.7	11.0	68.3	807.0	0.0						887
9	12.0	0.5	7.4	46.5	1,061.2	74.0						1,190
10	7.4	0.3	4.3	32.2	946.7	188.9	0.0					1,170
11	2.6	0.1	2.9	21.6	644.1	248.3	35.9					953
12	0.0	0.0	1.8	12.5	446.2	221.6	91.5	0.0				774
13			0.6	8.4	298.8	150.7	120.3	24.8				604
14			0.0	5.2	172.7	104.4	107.4	63.2	0.0			453
15				1.8	116.4	69.9	73.0	83.1	19.6			364
16				0.0	71.8	40.4	50.6	74.2	49.9	0.0		287
17					25.2	27.2	33.9	50.5	65.6	16.3		219
18					0.0	16.8	19.6	35.0	58.6	41.6	0.0	172
19						5.9	13.2	23.4	39.8	54.7	14.0	151
20						0.0	8.1	13.5	27.6	48.8	35.8	134
21							2.9	9.1	18.5	33.2	47.0	111
22							0.0	5.6	10.7	23.0	42.0	81.3
23								2.0	7.2	15.4	28.6	53.1
24								0.0	4.4	8.9	19.8	33.1
25									1.6	6.0	13.2	20.8
26									0.0	3.7	7.7	11.4
27										1.3	5.2	6.5
28										0.0	3.2	3.2
29											1.1	1.1
30											0.0	0.0