EXAMPLE 5–2 Determination of Flowrate Equalization Volume Requirements and Effects on BOD Mass Loading For the flowrate and BOD concentration data (derived from Fig. 3–5) given in the following table, determine (1) the in-line storage volume required to equalize the flowrate, and (2) the effect of flow equalization on the BOD mass loading rate.

	Given data		Derived data	
Time period	Average flowrate during time period, m^3/s	Average BOD concentration during time period, mg/L	Cumulative volume of flow at end of time period, m^3	BOD mass loading during time period, kg/h
M–1	0.275	150	990	149
1–2	0.220	115	1,782	91
2–3	0.165	75	2,376	45
3–4	0.130	50	2,844	23
4–5	0.105	45	3,222	17
5–6	0.100	60	3,582	22
6–7	0.120	90	4,014	39
7–8	0.205	130	4,752	96
8–9	0.355	175	6,030	223
9–10	0.410	200	7,506	295
10–11	0.425	215	9,036	329
11–N	0.430	220	10,584	341
N–1	0.425	220	12,114	337
1–2	0.405	210	13,572	306
2–3	0.385	200	14,958	277
3–4	0.350	190	16,218	239
4–5	0.325	180	17,388	211
5–6	0.325	170	18,558	199
6–7	0.330	175	19,746	208
7–8	0.365	210	21,060	276
8–9	0.400	280	22,500	403
9–10	0.400	305	23,940	439
10–11	0.380	245	25,308	335
11–M	0.345	180	26,550	224
Average	0.307			213

Note: $m^3/s \times 35.3147 = ft^3/s$
$m^3 \times 35.3147 = ft^3$
$mg/L = g/m^3$

Solution

1. Determine the volume of the basin required for the flow equalization.
   a. The first step is to develop a cumulative volume curve of the wastewater flowrate expressed in cubic meters. The cumulative volume curve is obtained