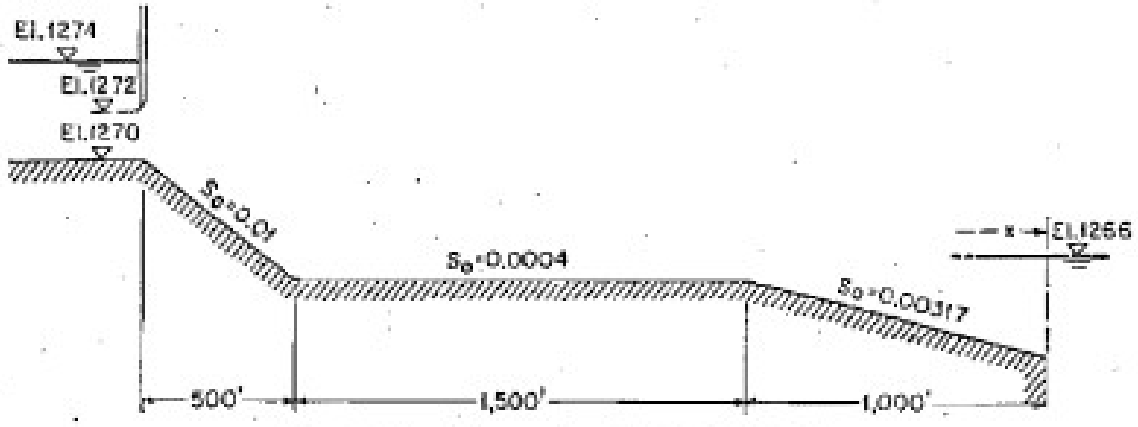

FIG. 9-14. A channel profile for Prob. 9-8.

9-8. A rectangular channel (Fig. 9-14), 20 ft wide, consists of three reaches of different slopes. The channel has a roughness coefficient $n = 0.015$ and carries a discharge of 500 cfs. Determine:

a. the normal and critical depths in each reach

b. the possible flow profiles

c. the distance x from the outlet of the channel to the point where the backwater curve terminates. The backwater curve is assumed to be a horizontal line.

Example 10-1. A trapezoidal channel having $b = 20$ ft, $z = 2$, $S_0 = 0.0016$, and $n = 0.025$ carries a discharge of 400 cfs. Compute the backwater profile created by a dam which backs up the water to a depth of 5 ft immediately behind the dam. The upstream end of the profile is assumed at a depth equal to 1% greater than the normal depth. The energy coefficient $\alpha = 1.10$.

Example 10-2. With reference to the channel described in Example 10-1, compute the length of the backwater profile extending from the dam site to an upstream section where the depth of flow is 1% greater than the normal depth.

Example 10-3. Water flows from under a sluice into a trapezoidal channel having $b = 20$ ft, $z = 2$, $S_0 = 0.0036$, $\alpha = 1.10$, and $n = 0.025$. The sluice gate is regulated to discharge 400 cfs with a depth equal to 0.55 ft at the vena contracta. Compute the flow profile. If a hydraulic jump occurs at the downstream end, starting with a depth

10-9. If the slope of a channel having the section properties described in Example 10-1 has a break in grade changing from 0.0016 on the upstream side to 0.0169 on the downstream side, compute the flow profile on the downstream side from the break to a section where the depth is 1% greater than the normal depth. Use:

10-16. A prismatic trapezoidal earth spillway with 3:1 side slopes is discharging 1,500 cfs. The bottom of the spillway is horizontal and is 200 ft long and 75 ft wide in the reach between a downstream critical control section and the upstream reservoir. Manning's n is estimated to be 0.035. Using any method given in this chapter, determine:

a. The flow profile between the reservoir and the control section
b. The friction loss through this spillway measured in ft
c. The elevation of the pool level in the reservoir