6.2. A 10-m wide, rectangular, concrete-lined canal has a bottom slope of 0.01 and a constant-level lake at the upstream end. The water level in the lake is 6.0 m above the bottom of the canal at the entrance. If the entrance losses are negligible, determine

   i. The flow depth 800 m downstream of the canal entrance; and
   ii. The distance from the lake where the flow depth is 2.5 m.

6.3. A trapezoidal channel having a bottom slope of 0.001 is carrying a flow of 75 m³/s. The channel bottom is 50 m wide, $n = 0.025$, and the channel side slopes are 1 vertical to 1.5 horizontal. If a control structure is built at the downstream end that raises the water depth at the downstream end to 12 m, determine the amount by which the channel banks must be raised along its length. Assume the channel had uniform flow prior to the construction of the control structure.

6.4. A 5 km long lined canal has a free overfall at the lower end and a constant-level reservoir at the upper end. If the critical depth at the fall is 4 m, determine the minimum water level in the lake assuming $n = 0.013$ and the head losses at the entrance $= 0.2V^2/(2g)$. The canal bottom width is 8.0 m, side slopes are 1V : 1.5V, and the channel bottom slope is 0.0001.

6.8. Investigate the sensitivity of the computed water level at a distance of 5 km upstream from the outfall by using different increments for the flow depth and different distance locations in Prob. 6-4.

6.18. Debris accumulation at a bridge raised the water level to 12 ft. The trapezoidal flood channel is 20 ft wide at the bottom, has side slopes of 2H : 1V, and the channel bottom slope is 0.0003. How far will the effect of clogging extend for a flow of 800 ft³/sec.

6.20. A 10-m wide, rectangular, concrete-lined channel ($n = 0.013$) has a bottom slope of 0.01. There is a constant-level lake at the upstream end with the lake water surface 5 m above the channel bottom. If the flow depth at the channel entrance is critical, determine the locations where the flow depth is 3.9, 3.7, 3.5, 3.3, and 3.0 m.

6.21. A rectangular canal is 10 m wide and carries a flow of 50 m³/s. The bottom and sides of the canal are concrete-lined, the longitudinal bottom slope is 0.0006 and the canal ends in a free outfall. What is the depth of flow 2 km upstream of the fall? Assume the concrete lining has deteriorated somewhat due to weathering.

   If the flow depth is critical at a distance of $4y_c$ upstream of the fall, compute the water surface profile in the canal.

6.25. The normal depth in a 10 m wide rectangular channel with a bottom slope of 0.001 is 2 m. The Manning n for the flow surfaces is 0.020. The channel is constricted to build a bridge which raises the water level on the upstream side of the bridge by 2 m. Determine the distance from the bridge where the flow depth is 3.5 m.