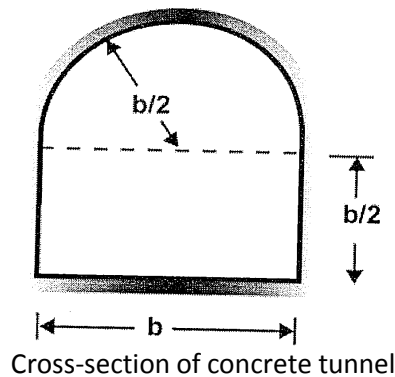


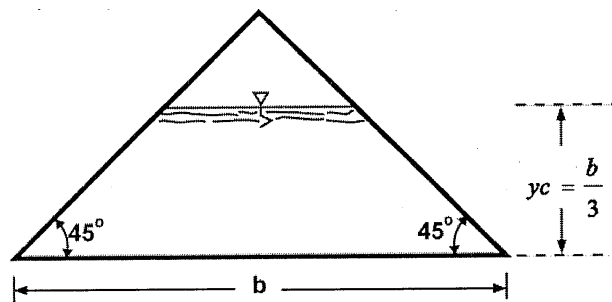
## Final Exam Open Channel Hydraulics Fall 2010

Instructor: Dr. Arturo Leon

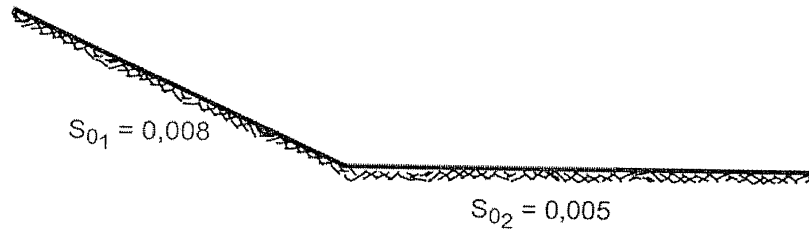
- 1) A concrete tunnel ( $n = 0.013$ ) has a bottom slope of 0.0002 and has the cross-section shown below. If the maximum flow discharge (maximum hydraulic efficiency) that can convey this tunnel is  $2 \text{ m}^3/\text{s}$ , Find:
- The bottom width  $b$
  - The flow depth  $y$
  - The average velocity of the flow  $v$



- 2) If the critical flow depth for the following cross-section is  $y_c = b/3$ , determine " $b$ " as a function of the flow discharge ( $Q$ ).

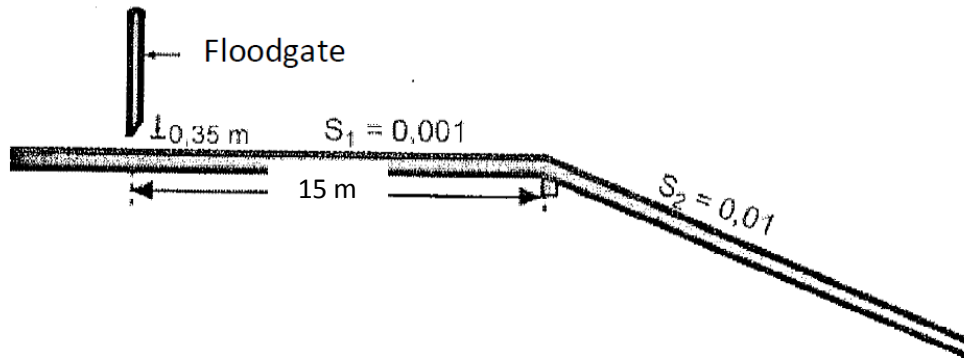


- 3) A rectangular canal, which longitudinal profile is shown below, conveys a flow discharge of  $1.5 \text{ m}^3/\text{s}$ . If the bottom width is 2 m and the Manning's roughness coefficient is 0.014, Determine:
- Name of flow profiles
  - Water surface profile (try to determine at least 5 important points in the profile). You can use Hcanales.



Longitudinal profile of canal

- 4) A rectangular canal of concrete ( $b = 2 \text{ m}$ ,  $n = 0.015$ ), which longitudinal profile is depicted below conveys a flow rate of  $2.5 \text{ m}^3/\text{s}$ . A floodgate having an opening ( $a$ ) of  $0.35 \text{ m}$  is installed in this canal as shown below. The vena contracta occurs  $1.5 \text{ m}$  downstream of the gate and has a water depth of  $y = C_c \times a$  where  $C_c$  (Contraction coefficient) =  $0.61$ . Determine: (You can use Hcanales)
- Name of flow profiles
  - Water surface profile in the entire canal (upstream and downstream of floodgate)



Longitudinal profile of canal