CE 544 Open Channel Hydraulics
Mid-term, Winter 2015

Instructor: Arturo Leon

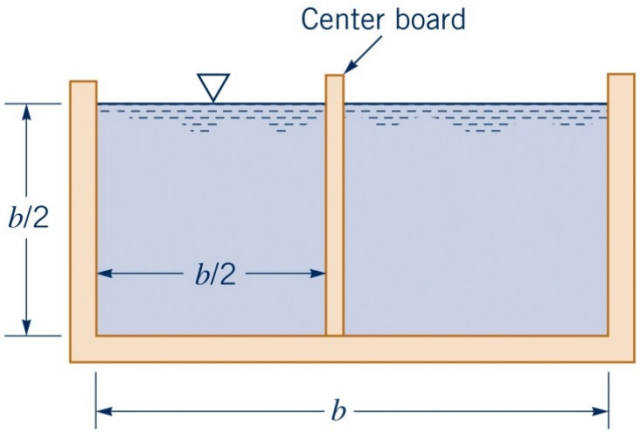
Name: _____ **Date:** 02/16/2015

- ✓ **You will have 50 minutes to complete the exam. The exam is closed book, closed notes and open mind.**
- ✓ **The procedure will be graded. Please justify your answers**

1. (25 points) A trapezoidal channel is to be designed to carry a discharge of 75 m^3/s at **maximum hydraulic efficiency**. The side slopes of the channel are 2H:1V and the Manning's roughness *n* is 0.030.
   a. If the maximum allowable velocity in the channel is 1.75*m/s*, what should be the dimensions of the channel (bottom width and height)?
   b. What should be the longitudinal slope of the channel if the flow is uniform?

2. (25 points) A 10-ft wide rectangular channel is flowing at a depth of 10-ft with a velocity of 10 ft/s. If the channel has a smooth contraction in width from 10 ft to 8 ft, how much should the channel bottom drop to maintain a constant water surface elevation through the transition? (Head loss coefficient = 0)

3. (25 points) By what percent is the flowrate reduced in the rectangular channel shown in figure below because of the addition of the thin center board? All surfaces are of the same material.



4. (15 points) A hydraulic jump at the base of a spillway of a dam is such that the depths upstream and downstream of the jump are 0.90 and 3.6 m, respectively. If the spillway is 10 m wide, what is the flowrate over the spillway?