CE 365K Hydraulic Engineering Design **Spring 2016**

Assignment 1
Open Channel Design using FlowMaster

The solution to this homework should be posted in pdf format to the Canvas web site for this class under Assignment 1 by Thursday Jan 28.

It is assumed for this tutorial that you have installed the Bentley FlowMaster program on your own computer as described at: http://www.caee.utexas.edu/prof/maidment/CE365KSpr16/Bentley/InstallBentleySoftware.pdf You may also use the FlowMaster program installed in ECJ 2.206 or on the CAEE Virtual Desktop.

1. Use the FlowMaster tutorial in the Haested text pp. 28-30 to design a Trapezoidal channel of 0.2m base width width, 0.3m normal depth, concrete materials, and of slope 0.05. The discharge is 0.6 m3/s. Include in your solution:

(a) A screen capture of the **Worksheet**

(b) A screen capture of the **Rating Curve**

(c) A screen capture of the **Cross Section**

Close the program and save your worksheet.

2. Use hand computation to replicate the Flow Area, Wetted Perimeter, Hydraulic Radius, Critical Depth, Velocity, Velocity Head, Specific Energy and Froude Number for the flow conditions in Problem 1.

3. Now suppose we change to US units. Open the Flowmaster program and create a new Worksheet. Change the default settings to US units. Suppose we have a longitudinal slope of 0.05, roughness of 0.013, normal depth of 3ft, and we want to design a trapezoidal channel with 3H:1V side slopes that will convey a discharge of 2000cfs. Determine the required bottom width (ft). Show a screen capture of the resulting **Cross Section** in your solution. What is the Froude Number for this solution? Is this Supercritical or Subcritical flow?

4. Change the slope in #3 to 0.001 and the normal depth to 6 ft, and resolve for the new bottom width (ft) of a trapezoidal channel. Show a screen capture of the resulting **Cross Section** in your solution. What is the Froude Number for this solution? Is this Supercritical or Subcritical flow?

5. Solve Haested Problem 14, p. 37. A rectangular concrete channel with a width of 1m and a height of 0.5m is on a slope of 0.008 m/m. Design a concrete circular channel for with the depth is half of the diameter and the flow area is the same as that of the rectangular channel. Which channel is more efficient and by how much?