Applied Hydraulics – Week 2 – Specific Energy, Broad Crested Weirs

Reading Assignment: Chin, Ch. 3, specific energy (pp. 119 – 126), broad-crested weirs (sec. 3.4.1.2, pp. 158-161)

Homework Problems: due Monday, September 10, in class. From Chin, problems 3.25, 3.27, 3.28, 3.31, 3.73, 3.74

Hands-on Assignment

Before the experiment, create a spreadsheet that calculates velocity, specific energy and Froude number for a range of water depths from 0.005 to 0.125 m. Put the water depth in the first column, and the other parameters in other columns. Use a depth increment of 0.005 m between each row. Use these two flow rates:

- Q = 2.0 L/s
- Q = 0.5 L/s

 Use a flume width of 0.075 m (75 mm).

Setup the teaching flume as follows:

1. Set the bed slope to be horizontal
2. Set the flow to 2.0 L/s.

Locate the false floor sections and measure the height of the various floor section configurations (one, two, or three thicknesses). Also, locate the broad-crested weir, and measure its height.

With the flume set up as described above, add the three false floor sections, one at a time to the downstream end of the flume. Once in place, measure the water depth upstream of the false floor and over the false floor.

Take a second set of depth readings at the lower flow rate.

As you take the depth readings for each case, use your spreadsheet and the measured height of the false floor sections or the weir to calculate the total energy head corresponding to the upstream and downstream depths. Put these values into a table on the whiteboard at the front of the lab.

Now remove the false floor sections. In the upper-middle part of the channel, place the broad-crested weir. Use the metal hook to hold the weir down. The curved corner of the weir should be placed on the upstream end of the channel. Measure the water depth over the weir, and upstream of the weir for both the

smaller and larger flow rates. Add the corresponding information into the table on the whiteboard.

To be done later (bring this to the class lecture that follows this lab)

Create a table giving the velocity, water surface elevation, water depth, specific energy, total energy, and Froude number for each case of the three false floor cases, and for the case with the weir, at both the upstream and downstream ends of the channel. Do this analysis for both the smaller and larger flow rates.