CE 365K Hydraulic Engineering Design **Assignment 2** **Spring 2015**

Question 1: Flow over a weir

A stream that is 50 ft wide has a concrete weir that is 5 ft high built across it to provide a pool upstream for pumping water out of the stream. If the flow of water in the stream is 200 cfs, determine the headwater elevation of water above the crest of the weir (ft). Assume that the tailwater elevation is 3 ft above the stream bed. Use a weir coefficient of 3.367. What is the velocity of flow over the weir (ft/s)? Solve the problem by hand and check your result with FlowMaster. Show a screen capture of the FlowMaster results.

Question 2: Flow into a Drainage Pipe

Suppose there is a road with a circular concrete pipe of 4 feet in diameter whose bottom is at stream-bed elevation which carries the flow of the stream under the road. The elevation of the road is 10 feet above the stream bed. The tailwater elevation is 0. If the inlet to the pipe functions as an orifice, determine how much flow (cfs) the pipe will carry before water starts to flow across the road. Determine the velocity of flow into the pipe inlet (ft/s). Assume a discharge coefficient of 0.6. Solve the problem by hand and check your result with Flowmaster. Show a screen capture of the Flowmaster results.

Question 3: Drainage on Dean Keaton St

The image below shows a section of Dean Keaton St adjacent to Robert Lee Moore Hall on our campus. The road cross-section profile was measured by very accurate land-based LIDAR.

Distances measured from the map show:

Line	**Length (m)**
AB	20.0
BC	94.6
CD	20.1
AD	93.4

Assume the longitudinal slope of the line BC is 4.24%

(1) What is the transverse slope (%) of the road from the crown at the middle of the road to the gutter at C?

(2) Compute the design inflow (cfs) for the stormwater inlet at location C for storms of return periods of 2, 5, 10, and 25 years.

(3) Compute the spread of the water across the street just upstream of inlet C (ft) for the 25 year flood. Is this a problem for impeding traffic?

(4) The stormwater inlet at C has a length of 10 ft. Does it have sufficient capacity to capture all of the flow of a 25 year storm on this street?

(5) Suppose now that the total drainage area contributing flow to this location on Dean Keaton St is actually 10 times larger than just the flow from the street itself, and that its time of concentration is 10 min. Recompute the design flow, the spread of water on the street and the amount of flow captured at inlet C for the 25 year storm. Compare these results to your earlier answers. Will the inlet C have sufficient capacity to capture all this water? If not, what % of the flow will it capture?