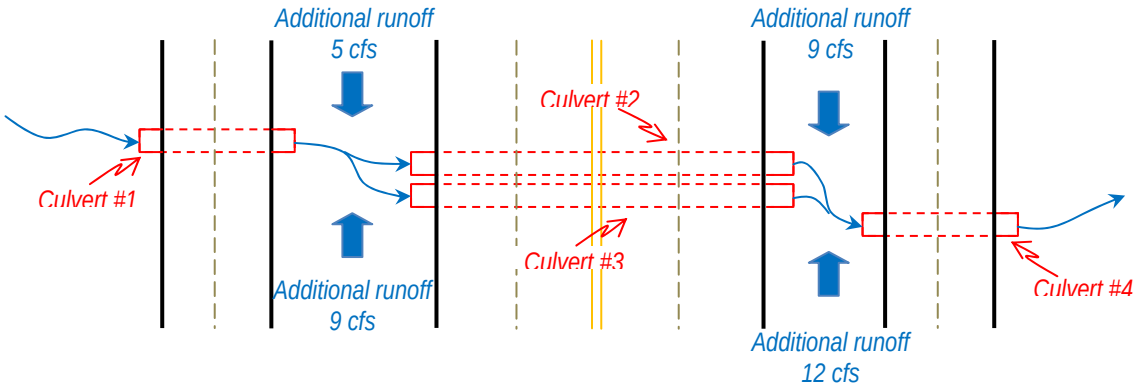
CVEN 339 – Water Resources Engineering
Summer Semester 2012
Dr. Kelly Brumbelow, Texas A&M University

Exam #1

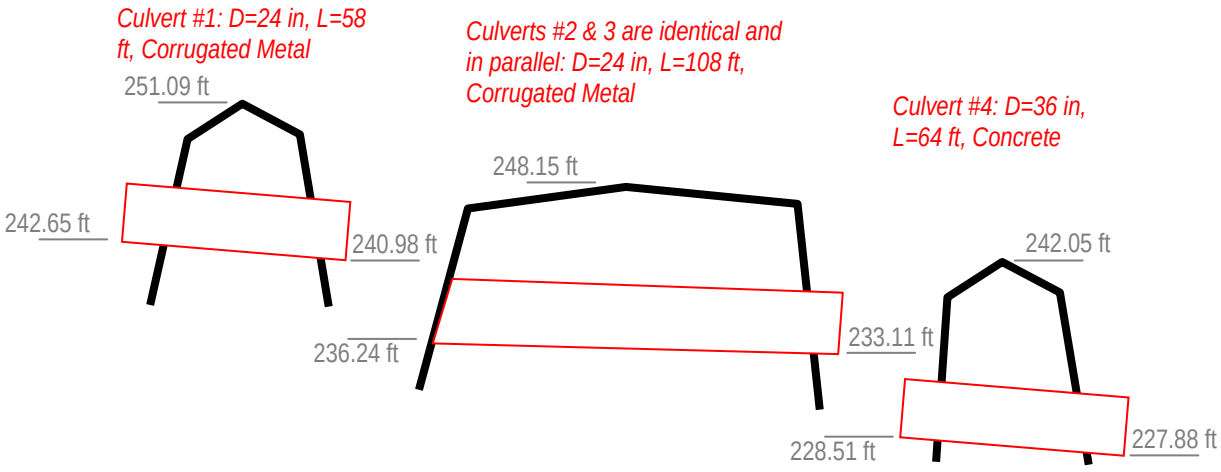
Open-book, Open-notes (3pages, 2 questions); Time allowed: 120 minutes

1. The drawing below shows a cross-sectional view of a large freeway built with parallel access roads. Water flows in a stream from left to right in the drawing through a series of culverts; the stream is indicated by the blue line. During rain storms, additional runoff will enter the drainage ditches between road crowns as shown in the drawing. You may assume that the tailwater elevation for culvert #4 is always below227.88 ft. *What is the maximum creek flow that may enter this area (i.e., from the left) so that there is no roadway overtopping?* (50 points)

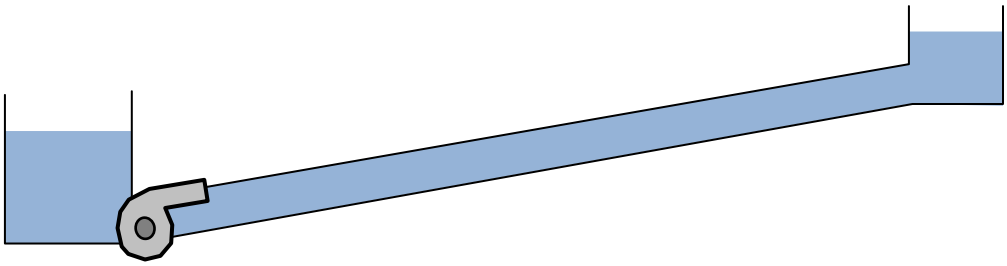
P L A N



S E C T I O N



2. A pipeline to connect two new reservoirs is currently under design, and several alternatives are being considered. The basic system is sketched below, and the various design alternatives are listed in the table. The characteristic and efficiency curves for the pump to be used are given in the graph. Only 1 pump stage will be used. *For each design alternative, determine the flowrate that will occur in the pipeline and the pump's shaft power requirement.* A sheet of graph paper is attached for your use, if convenient. (50 points)



Design Alternative	Lower Reservoir Elevation (ft)	Upper Reservoir Elevation (ft)	Pipeline Diameter (inches)	Pipeline Length (ft)	Pipeline Material
#1	823	877	24	2500	Welded Steel
#2	823	877	18	2500	Welded Steel
#3	817	894	18	2500	Welded Steel