

CVEN 339 – Water Resources Engineering  
 Summer Semester 2013  
 Dr. Kelly Brumbelow, Texas A&M University

Exam #1

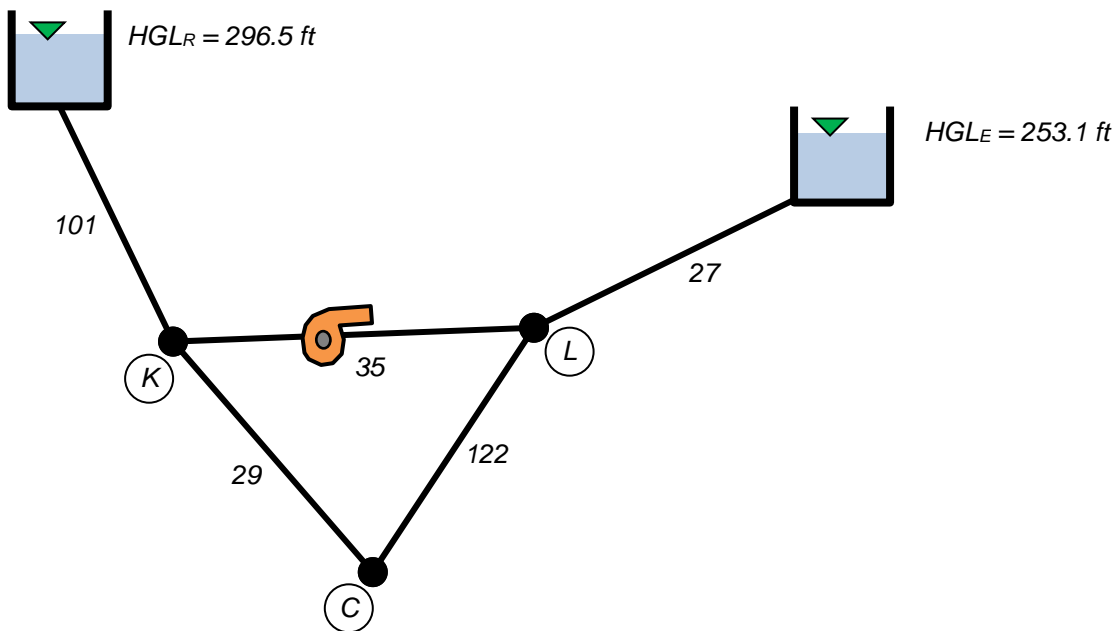
**Open-book, Open-notes (2 pages, 2 questions); Time allowed: 60 minutes**

Write all work on separate sheets of paper. Do not write work on the questions sheets – they will not be collected.

1. A simple pipe network is drawn below, and relevant physical properties and technical data are given.

- (a) Determine flow rate (cfs) and direction (e.g., “from node X to node Y”) in all pipes.
- (b) Determine pressure (psi) at node C.

(60 points)

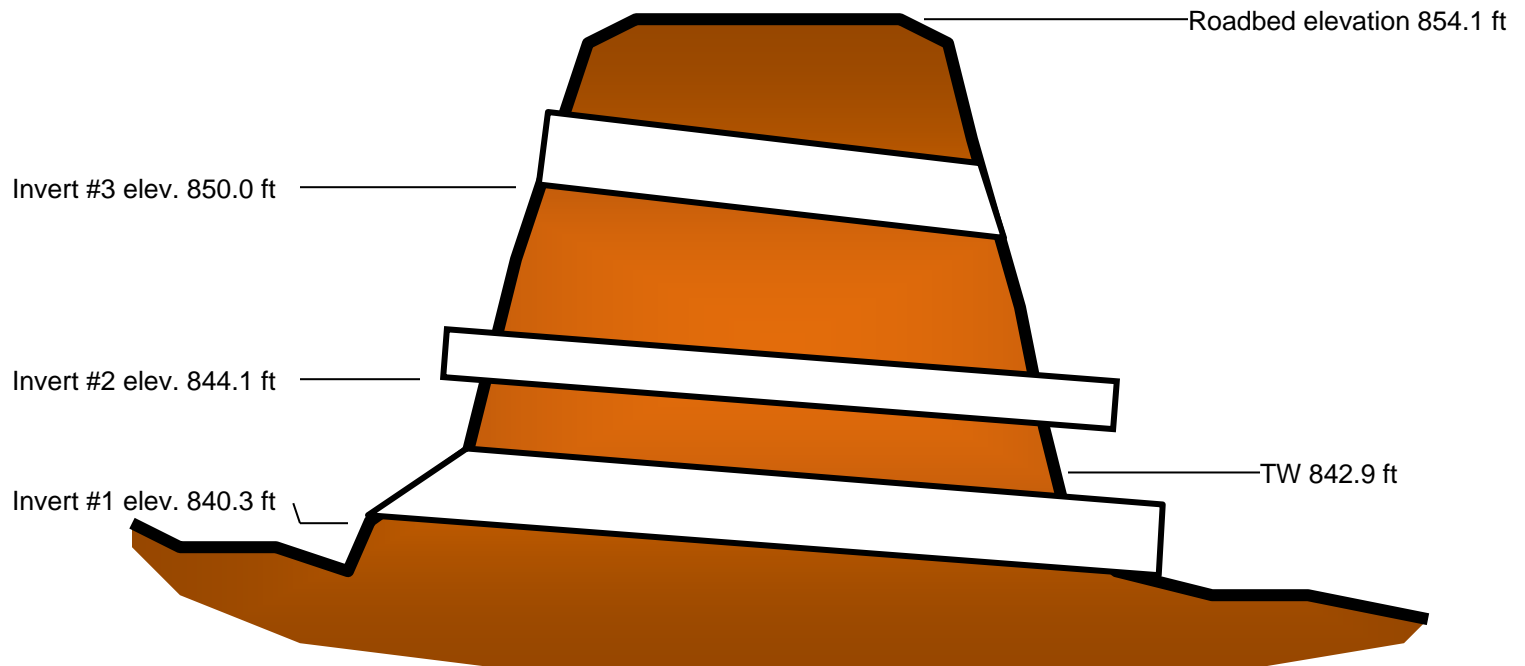


Pipe	Length (ft)	Diameter (in)	Roughness, $f$
101	1000	10	0.015
29	500	6	0.015
35	500	6	0.015
122	500	6	0.015
27	1000	10	0.015

Node	Elevation (ft)	Pressure (psi)	Demand (cfs)
K	122.1	41.6	3.1
L	139.1	41.6	2.0
C	35.1	?	8.4

Pump characteristic function:  $E_p = -0.3125 Q^2 - 3.75 Q + 50$ ,  $[E_p] = \text{ft}$ ,  $[Q] = \text{cfs}$

2. Shown in the diagram below is a road embankment with a set of 3 culverts installed at different elevations. If the tailwater elevation is expected to be 842.9 ft msl, *what is the maximum flow that can be passed through the embankment without overtopping the roadway?* (40 points)



Culvert #1 (bottom): 24 in diameter corrugated metal pipe  
73.5 ft long  
mitered entrance, projecting exit

Culvert #2 (middle): 12 in diameter PVC pipe  
96.6 ft long  
projecting entrance, projecting exit

Culvert #3 (top): 18 in diameter corrugated metal pipe  
42.2 ft long  
projecting entrance, mitered exit