CE 3372 – Water Systems Design
Exercise Set 7

Purpose:	Gain experience in use of a professional software (EPANET)
Task(s):	Compute flow distribution in pipeline networks
	Interpret output to answer specific hydraulic questions

Exercise

1. Figure 1 is a five-pipe network with a water supply source (a reservoir, not shown) connected at Node 1, and demands at Nodes 1-5. Table 1 is a list of the relevant pipe and node data.

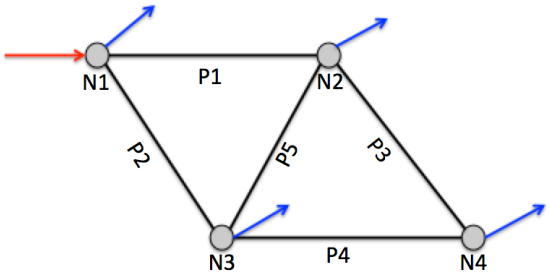

Figure 1: Layout of Simple Network

Table 1: Node and Pipe Data

Pipe ID	Diameter (inches)	Length (feet)	Material
P1	8	800	PVC
P2	8	700	PVC
P3	8	700	PVC
P4	8	800	PVC
P5	6	600	PVC
Node ID	**Demand (CFS)**	**Elevation (feet)**	
N1	2.0	0.0	
N2	4.0	0.0	
N3	3.0	0.0	
N4	1.0	0.0	

Build an EPANET model, using the Hazen-Williams head loss model of the network. From your model preparations and/or the actual simulation runs:

a) Write the node equations of continuity for Nodes 1-4. Use the naming convention on the figure.

b) Write the head loss equations for each of the pipes in the system, use the naming convention on the figure.

c) Make a screen capture of the EPANET program showing your network map, with the Node ID and Node Pressures displayed on the map, and with the Pipe ID and Pipe Flow Rates on the map.

d) Determine the flow rate in each pipe of the network, for the case where the total head at Node 1 is 100 feet.[1]

e) Make a table that lists each node name, node elevation, and the resultant pressure in U.S. Customary units.

f) Make a table that lists each pipe name, length, diameter, Hazen-Williams coefficient, and the resultant flow rate in U.S. Customary units.

g) Using the simulation results, determine the head loss from Node 1 to Node 4.

h) Identify the node with the lowest pressure in your solution.

Attach the EPANET output report to your solution.

[1]You can add a reservoir to Pipe 0 (the red link in the drawing), and adjust total head in that reservoir until computed head at Node 1 is 100 ft. The connecting Pipe 0 parameters are pretty arbitrary. Use a short, fat, smooth pipe in such instances, so there is virtually no head loss between the fictitious reservoir and the network.