CIVL 5995 Project I Fall 2013

Design Project: Pipe Network Analysis Using WaterCad

Objectives:

(a) Compute the discharge in each pipe and the pressure at each junction for the network described below (Fig.1) using WaterCad. Important information about the pipes, nodes and pumps is provided in the following tables.

(b) What would be the discharge in each pipe and the pressure at each junction if the demand at all the junctions is doubled?

(c) What would be the discharge in each pipe and the pressure at each junction if the demand at all the junctions is halved?

(d) What would be the discharge in each pipe and the pressure at each junction if tank T-2 and pipe P-21are removed?

(e) What would be the discharge in each pipe and the pressure at each junction if tank T-2, pipe P-21, reservoir R-2, pump PMP-2 and pipe P-17 are removed?

Notes:

(a) List the contribution of each team member clearly mentioning the tasks and time taken to complete each task.

(b) Any non-cited equation, figure, graph or table will be subjected to negative marking.

Table 1. Pump Data for PMP-1 and PMP-2

H_p (m)	Q (m^3/s)
61.0	0
53.4	0.28
33.5	0.57

Table 2. Reservoir data

Reservoir	Water Surface Elevation (m)
R-1	47.3
R-2	47.3

Table 3. Tank data

Tank	Minimum Water Surface Elevation (m)	Maximum Water Surface Elevation (m)	Initial Water Surface Elevation (m)
T-1	93.5	97.5	96.0
T-2	94.0	97.5	96.0

Table 4. Pipe data

Pipe	Length (m)	Diameter (mm)	Friction factor
P-1	1220	254	0.024
P-2	1829	254	0.024
P-3	1829	305	0.022
P-4	1982	610	0.018
P-5	2134	254	0.024
P-6	915	457	0.02
P-7	1524	254	0.024
P-8	91	305	0.022
P-9	152	457	0.020
P-10	1220	254	0.024
P-11	1220	610	0.018
P-12	1220	305	0.022
P-13	915	203	0.026
P-14	1524	305	0.022
P-15	1829	457	0.020
P-16	1829	457	0.020
P-17	152	610	0.018
P-18	1524	305	0.022
P-19	1524	305	0.022
P-20	915	254	0.024
P-21	92	457	0.020
P-22	915	305	0.022
P-23	915	305	0.022
P-24	305	152	0.028

Table 5. Junction data

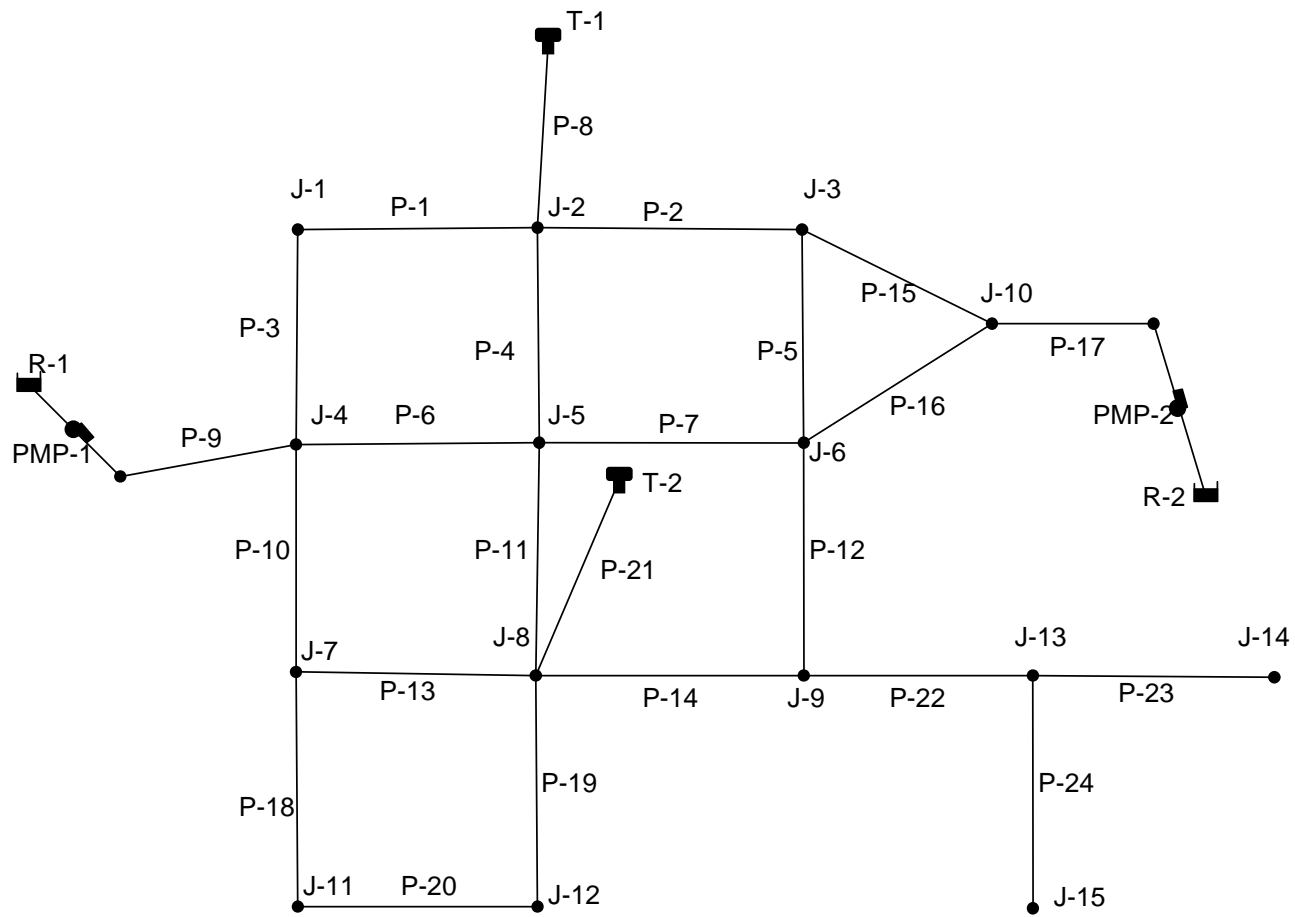| Junction	Ground Elevation (m)	Demand (L/s)
J-1	51.8	31.5
J-2	54.9	31.5
J-3	50.3	31.5
J-4	47.3	94.6
J-5	45.7	63.1
J-6	44.2	94.6
J-7	50.3	31.5
J-8	51.8	63.1
J-9	50.3	31.5
J-10	53.4	63.1
J-11	53.4	31.5
J-12	54.9	31.5
J-13	48.8	0
J-14	45.7	94.6
J-15	48.8	6.3

Figure 1. Pipe Network for Project I