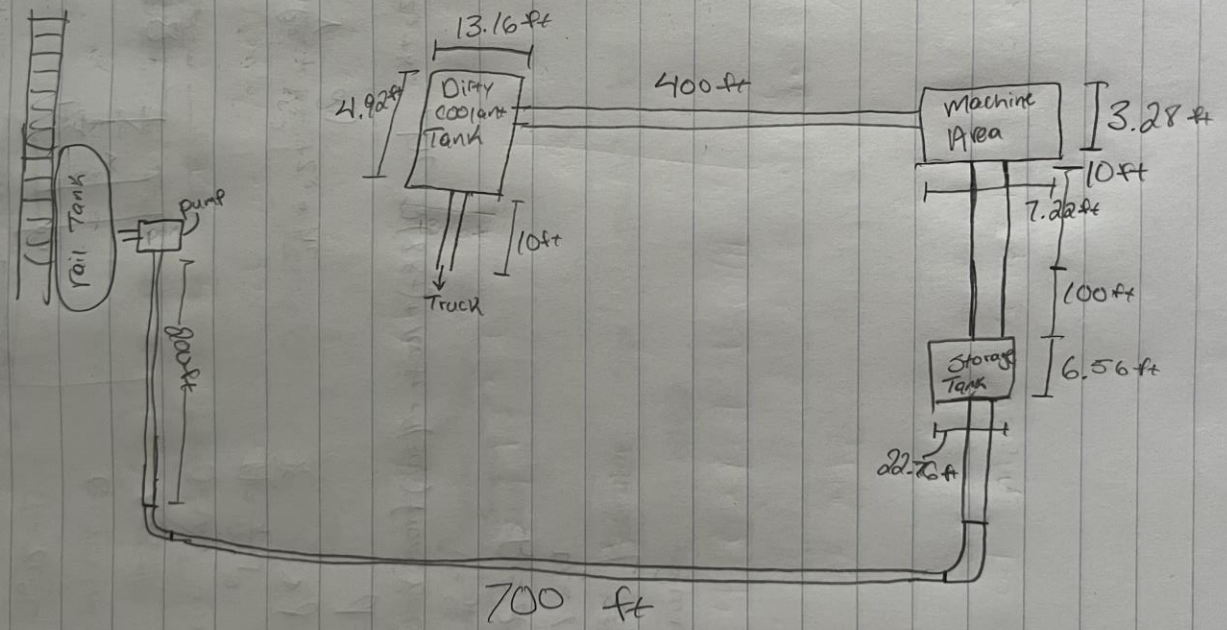
Final Exam Nicholas Albano

1.

- Storange Tank = 1000 gal (32 feet high)
- Temp = -20°F – 105°F
- Frostline is 30in below Surface
- Coolant is Sg=.94 (Freezing 0°F)
- Viscosity/vapor pressure are 1.5 Time water
- Rail Tank is 15,000 gal




Pipe selection: Sch 40 (Diameter 4in)

2.

- (2) 90° elbow $K = 30 f_T$
- (13) Pipe fittings 5in
- Sch 40 Steel pipe $D = 4in = .33 ft = .1016m$
- (1) 90° street Elbow $K = 50 f_T$

Resistance: $K = 6.25$

Velocity: $V = \frac{Q}{A} = \frac{400}{\pi (.1016)^2} \cdot \frac{1}{3600} = 13.705 \, m/s$

3. $f = .016$

$\nu = 1.95E-6$

$N_R = \frac{13.705(.1016)}{1.95E-6} = 7.14E5$

Energy loss

$h_L = \frac{6.25(13.705)^2}{2(9.81)} = 59.8$

4. Preliminary Requirements of Pump

- Reservoir Auto system have 1000 gal
- Pump head must be larger than 100 ft
- Flow rate is atleast 13.7 m/s
- Viscosity is 1.5 Times water

5. A kinetic pump uses a spinning impeller and shoots out fluid ~~at~~ an increase Rate. Positive displacement pumps use a cavity then force out the fluid. Kinetic pumps are often used as water supply systems and not positive Disp. pumps. The Radial pump is what will be used because the flow goes through the center of the impeller

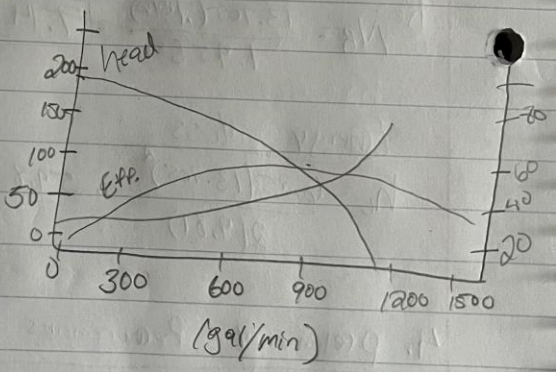
6. Using Sulzer Chart:

$h_A = H_c + \Delta z + \frac{V^2}{2g} = 115.3$ ft

$Q = 787.2$ gal·min

Pump: 4x6x14A-1 OHH

Power: P = 30 hp?




7. Electrical motor: 30 hp x 1.10 = 33 hp

8. It will not suffer cavitation

$NPSH_{Available} > NPSH_{Req}$

$NPSH_A = \frac{P_1 - P_v}{\gamma} \pm \Delta Z - H_{suction}$

NPSH = 26 ft

9. Material List

- Sulzer pump (4x6x14A)
- 90° Elbow (2)
- 90° street elbow (1)
- SCH 40 Steel pipe D=4
- Pipe fittings (13)
- Suction line valve (1)
- Check valve (1)
- Pressure gauge (1)