Homework #12 – Plumbing Systems

Points: 20

Due: 10/4/2022

USE 2-DECIMALS FOR GPM AND WSFU

Name: ___Solution_____

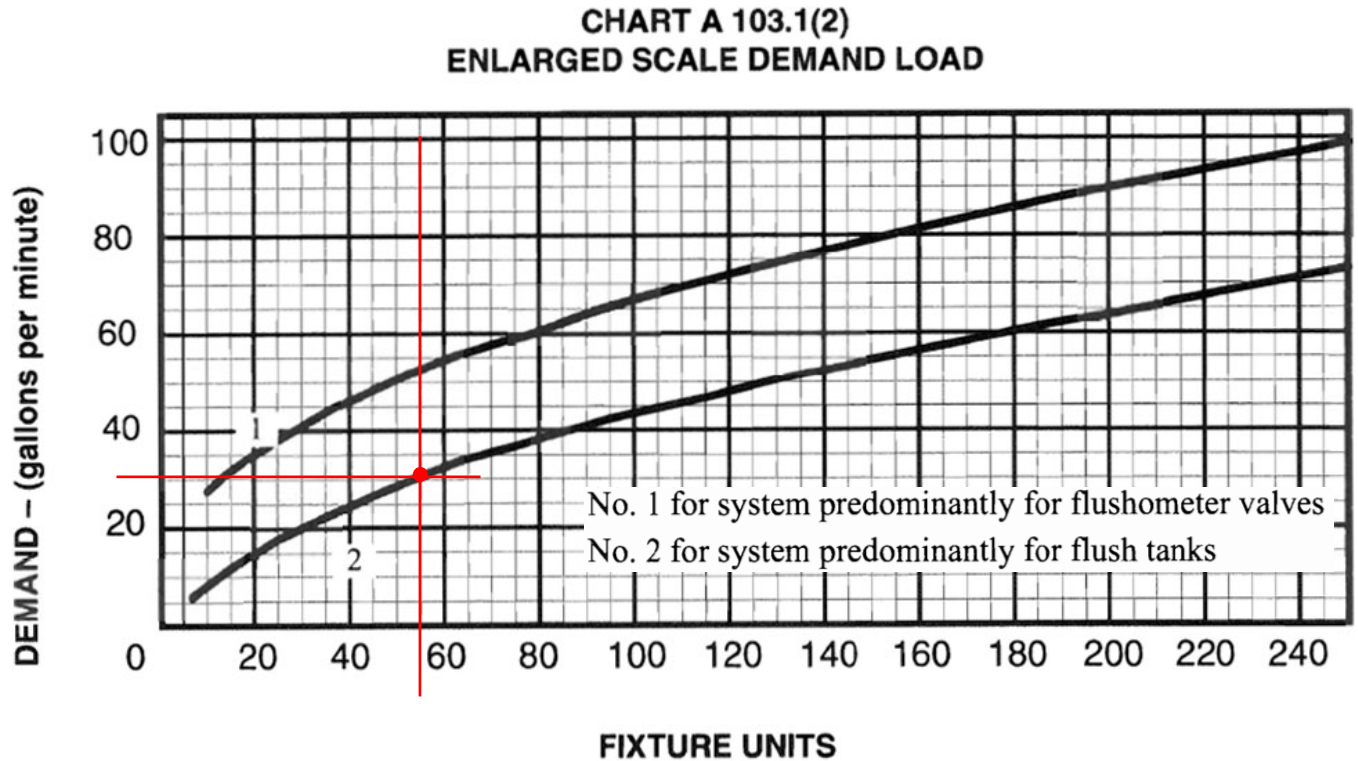1. Calculate the Total Demand Load (GPM) for the home used in homework #10 using the flow rates given.

Fixture	Number of Fixtures	Flow Rate (GPM)	Total (GPM)
Water Closet	5	3.0	15.00
LAV	7	2.2	15.40
Tub/Shower	3	5.0	15.00
Tub	1	5.0	5.00
Shower	1	2.5	2.50
Kitchen Sink	1	2.2	2.20
Dishwasher	2	3.0	6.00
Laundry Machine	1	3.0	3.00
Laundry Sink	1	2.2	2.20
¾" Hose Bibb	4	12.0	48.00
Total			114.30

2. Complete the total Water Supply Fixture Units (WSFU) for the home used in homework #10. Assume one segment of water distribution piping supplies two hose bibbs.

Fixture	Number of Fixtures	WSFU	Total WSFU
Water Closet	5	2.5	12.50
LAV	7	1.0	7.00
Tub/Shower	3	4.0	12.00
Tub	1	4.0	4.00
Shower	1	2.0	2.00
Kitchen Sink	1	1.5	1.50
Dishwasher	2	1.5	3.00
Laundry Machine	1	4.0	4.00
Laundry Sink	1	1.5	1.50
¾" Hose Bibb	4	2.5+1.0 X 2	7.00
		Total	54.50

3. Using the result for problem 2, determine the Demand Load Using Chart A 103.1 (2) Enlarged Scale Demand Load from the 2016 CPC. Show how you found the demand load on the chart below.

   Demand Load = __30 GPM_____

CHART A 103.1(2)
ENLARGED SCALE DEMAND LOAD

No. 1 for system predominantly for flushometer valves
No. 2 for system predominantly for flush tanks

FIXTURE UNITS

For SI units: 1 gallon per minute = 0.06 L/s

4. Based upon a maximum desired velocity of 8ft.sec, determine the minimum diameter (D_{i-min}) copper tubing for the demand loads found in problem 1 and problem 3. Show calculations (Answer use 3-DECIMALS).

   D_{i-min} - Problem 1

   $D_{i-min} = \sqrt{0.409\ Q / v}$ inch

   $\quad = \sqrt{0.409\ (114.30)/ 8}$ inch

   $\quad =$ 2.417 inch

   D_{i-min} - Problem 3

   $D_{i-min} = \sqrt{0.409\ Q / v}$ inch

   $\quad = \sqrt{0.409\ (30)/ 8}$ inch

   $\quad =$ 1.238 inch

5. Using the copper tubing handbook determine the size of copper tube for Type L. Complete the table below. Find pricing at: https://www.plumbingsupply.com/copperpipe.html

	Q (gpm)	v (fps)	D_{i-min}	Copper Tube: Type L	Price per 4 ft
Problem 1	114.30	8	2.417	2-1/2"	$157.36
Problem 3	30.00	8	1.238	1-1/4"	$54.37