**CMGT 235 – Electrical and Mechanical Systems**

Department of Construction Management 🏵 California State University, Chico

Homework #12 – Plumbing Systems

Points: 20

**USE 2-DECIMALS FOR GPM AND WSFU**

Due: 10/4/2022

Solution

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 | 2.00 |
| Laundry Sink | 1 | 2.2 | 2.20 |
| ¾” Hose Bibb | 4 | 12.0 | 48.00 |
| Total | 114.30 |

1. 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 |

1. 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.

30 GPM

**Demand Load = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**



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

Di-min - Problem 1

Di-min = √0.409 Q / v inch

Di-min = √0.409 (114.30)/ 8 inch

Di-min = 2.417 inch

Di-min - Problem 3

Di-min = √0.409 Q / v inch

Di-min = √0.409 (30)/ 8 inch

Di-min = 1.238 inch

1. 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) | Di-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 |