

## CMGT 235 – Electrical and Mechanical Systems

### In Class Activity #3 – WSFU and Sizing Supply Pipes

Points: 50 [4 points each properly formatted answer]

Due: At the End of Class Today

WRITE NEATLY

Check One: Worked as a:  GROUP  INDIVIDUAL

Name	Solution
Name	
Name	

Complete the following steps to determine the Meter and Street Service, the Building Supply, and the hot and cold supply pipe sizes for the Dwelling shown. Use 2016 California Plumbing Code.

Specifications: The minimum daily static service pressure available (MDSSPA) is 70 psi. The pressure loss in the meter is 5 psi and 15 psi in the water softener. The highest water outlet from the source of supply is 22 ft. The length of piping from the source of supply to the fixture in the building that is furthest away is 122 ft. Each side of the house has two ½" hose bibbs (total of 8). Half the hose bibbs are supplied by one segment of water distribution pipe and the other half by another segment. The dishwasher has only a hot water supply pipe.

#### Step 1. Calculate the Available Water Pressure

- A. Determine the pressure loss due to static head.

$$= 0.433 \text{ psi/ft} \times 22 \text{ ft} = 9.526 \text{ psi}$$

- B. Determine the Total Available Water Pressure Under no Flow conditions.

$$= 70 \text{ psi} - 5 \text{ psi} - 15 \text{ psi} - 9.526 \text{ psi} = 40.474 \text{ psi}$$

- C. Determine the pressure loss due Type M copper tube (9 psi/100 ft).

$$= 122 \text{ ft} \times 1.5 \times 9 \text{ psi/ft} = 16.47 \text{ psi}$$

- D. Determine the Available Pressure (@furthest Fixture).

$$= 40.474 \text{ psi} - 16.47 \text{ psi} = 24 \text{ psi}$$

- E. Is Type M copper tube ok? Why?

Yes. 24 psi is sufficient for the plumbing fixtures given

**Step 2.** Determine the Effective Maximum Developed Length (DL) of Pipe

$$DL = 122 \text{ ft} \times 1.5 = 183 \text{ ft}$$

**Step 3.** Use a yellow highlighter and COLOR and COUNT all plumbing fixtures shown on the main and first floor house plans provided. Complete the Water Supply Fixture Units Table shown below.

Water Supply Fixture Units							
Fixture	# of Fix.	HOT WSFU		COLD WSFU		TOTAL WSFU	
		EACH	THIS JOB	EACH	THIS JOB	EACH	THIS JOB
WC FT	8	---	---	2.5	20.0	2.5	20.0
BIDET	1	0.75	0.75	0.75	0.75	1.0	1.0
LAV	8	0.75	6.0	0.75	6.0	1.0	8.0
BT/SHW	2	3.0	6.0	3.0	6.0	4.0	8.0
SHW	3	1.5	4.5	1.5	4.5	2.0	6.0
BT	2	3.0	6.0	3.0	6.0	4.0	8.0
KS	1	1.125	1.125	1.125	1.125	1.5	1.5
DW	1	1.5	1.5	---	---	1.5	1.5
LS	1	1.125	1.125	1.125	1.125	1.5	1.5
BS	6	0.75	4.5	0.75	4.5	1.0	6.0
Hose Bibb	8	---	---	2.5	20.0	5.5x2	11.0
<b>TOTALS</b>			31.5		70.0		72.5

Using the GPM Table (Table 6-8 Conversion of Fixture Units to Equivalent gpm) and the interpolation method shown on the course Web site to determine the Demand Load (GPM).

If the Total Demand = 72.5 WSFU      What is the demand in GPM?

From Table 6-8 - Use Flush Tank Column

$$g_1 = 70 \text{ WSFU} \quad d_1 = 35 \text{ gpm}$$

$$g_2 = 80 \text{ WSFU} \quad d_2 = 38 \text{ gpm}$$

$$g = 72.5 \text{ WSFU (given value)}$$

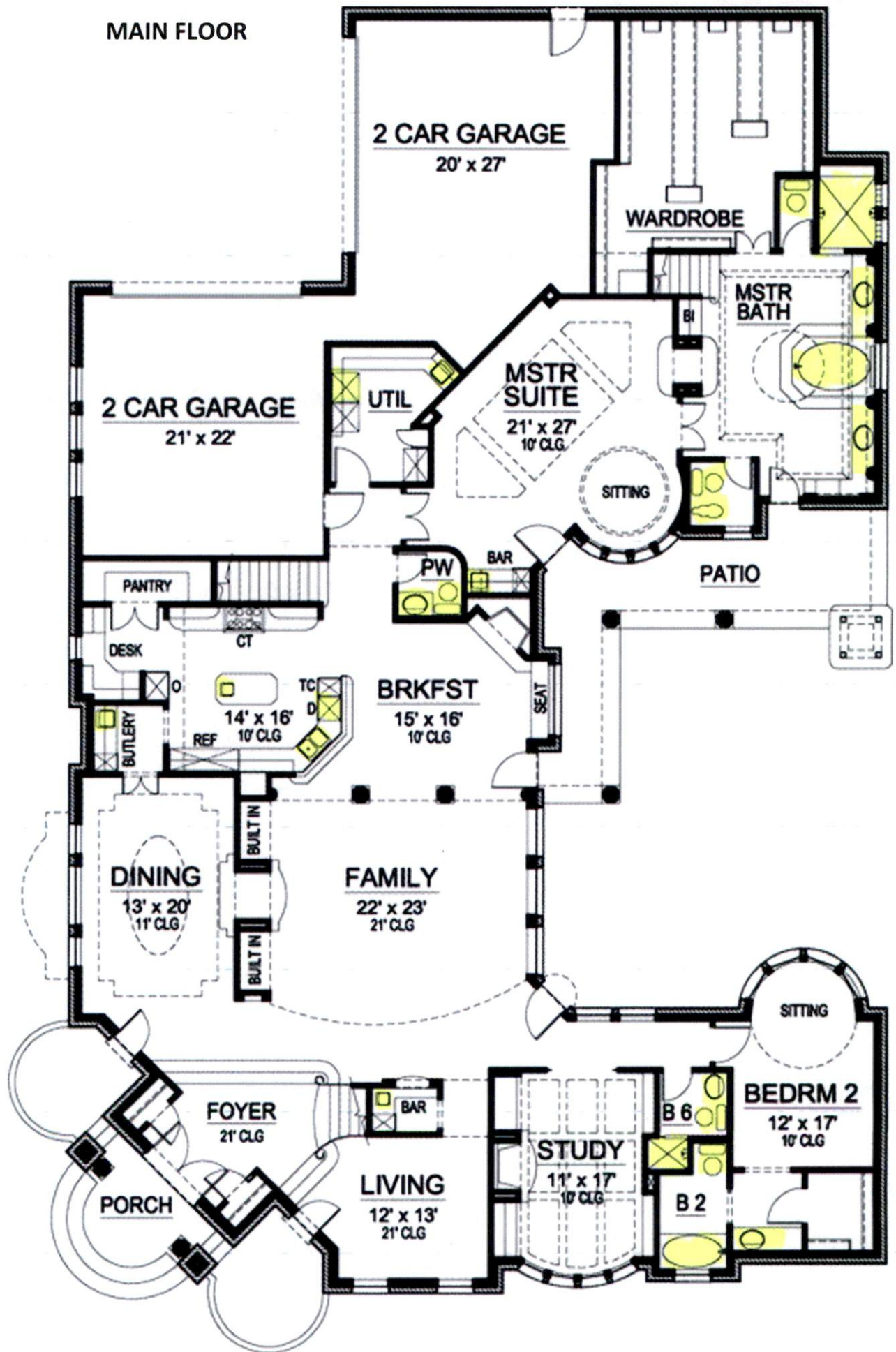
$$d = d_1 + (g - g_1 / g_2 - g_1) \times (d_2 - d_1)$$

$$d = 35 \text{ gpm} + (72.5 - 70 / 80 - 70) \times (38 - 35) = 35.75 \text{ gpm}$$

**Step 4.** Determine the Meter and Street Service, the Building Supply pipe size, and the hot and cold water supply pipe sizes using the 2016 CPC Table 610.4 complete the table below for your results:

Pressure Range (psi) (Table Used)	30 to 45 psi
Maximum Allowable Length (feet) (Column Used)	200 ft
Supply Distribution Piping	Pipe Size (inches)
Meter and Street Service	1"
Building Supply	2"
Cold water Supply	2"
Hot Water Supply	1 ¼"

MAIN FLOOR



FIRST FLOOR

