

CMGT 235 – Electrical and Mechanical Systems

Department of Construction Management ☻ California State University, Chico

Exam #2 [100 points]

You may work together as a group or individually. Every student SHALL complete their own answer sheet.
 All problems refer to the California Plumbing Code 2016 [Unless Noted Otherwise]

Name: _____

30 pts

- Determine the Meter and Street Service size and the Building Supply size for the Dwelling shown on the next page. MDSSPA = 80 psi. The highest water outlet in the building is 9 feet above the source of supply. Pressure loss due to the meter is 5 psi and the water softener has a pressure loss of 9 psi. The maximum length of the piping between the source of supply and the furthest fixture is 208 feet. Each side of the house has a ½" hose bibb (TWO HBs PER SUPPLY SEGMENT).

Step 1. Calculate the Available Water Pressure

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

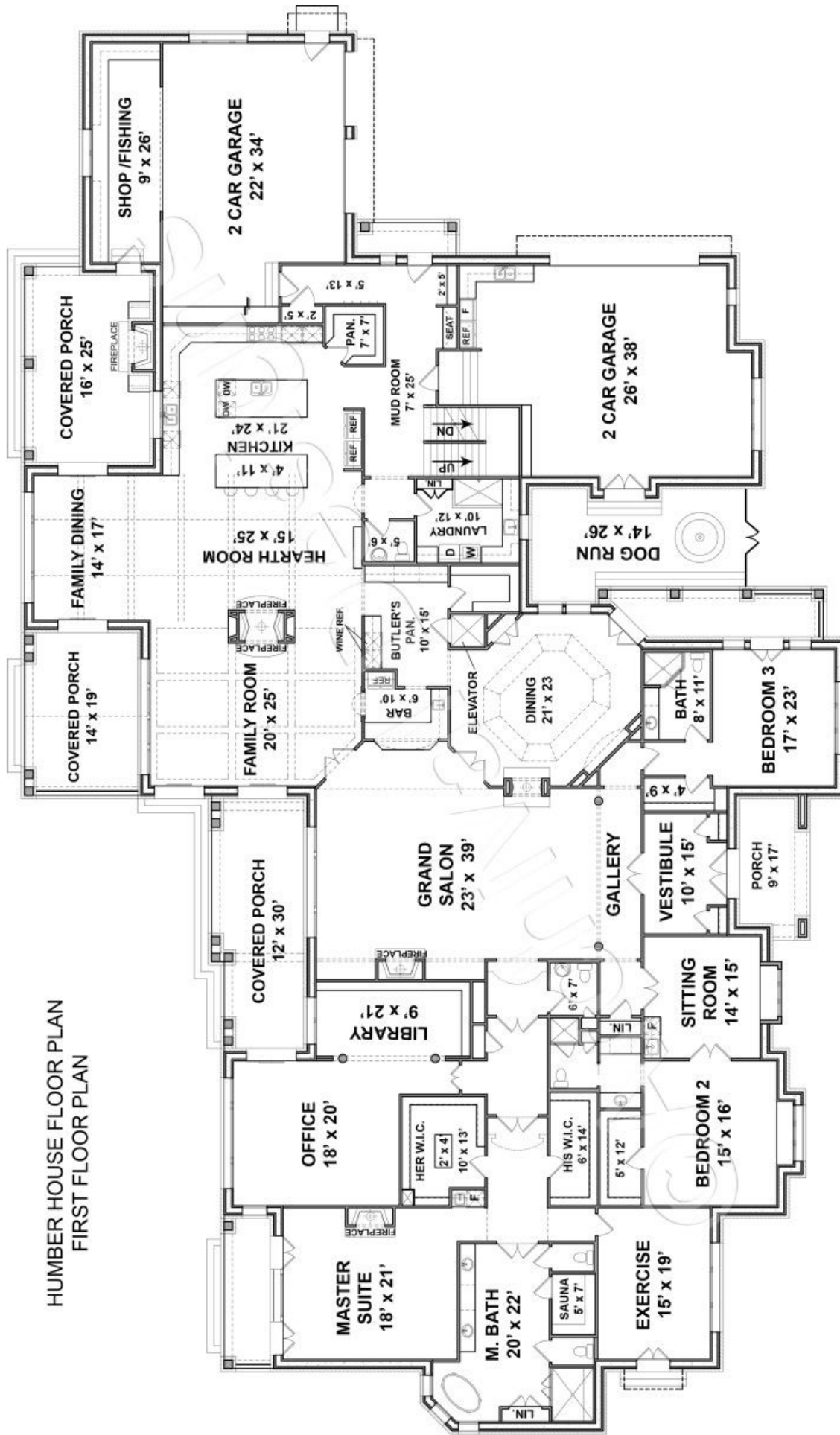
Step 3. Calculate the total WSFU [Table 610.3]

QTY	FIXTURE	WSFU	TOTAL WSFU
	WC		
	LAV		
	BT		
	SHW		
	KS		
	DW		
	BS		
	SS		
	LS		
	CW		
	HB		
TOTAL WSFU			

Step 4. Use the 2016 CPC Table 610.4 complete the table below for your results:

Pressure Range	
Maximum Allowable Length	
Distribution Piping	Pipe Size (inches)
Meter and Street Service	
Building Supply	

HUMBER HOUSE FLOOR PLAN
FIRST FLOOR PLAN



10 pts

2. A local restaurant has an occupancy of 250 people.
- a. Using the CPC 2016 complete the table for the required number of fixtures per person.

Water Closets		Urinals	Lavatories		Bathtubs or Showers	Drinking Fountains
Male	Female	Male	Male	Female		

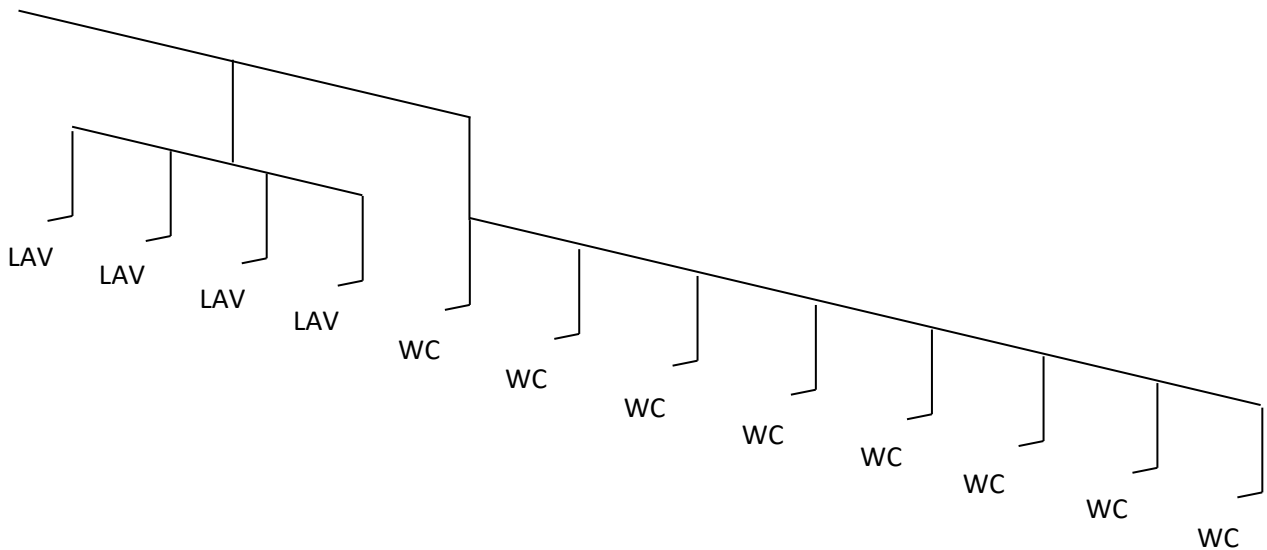
b. Where in the CPC 2016 did you find the requirements?

c. What other fixtures are required?

6 pts

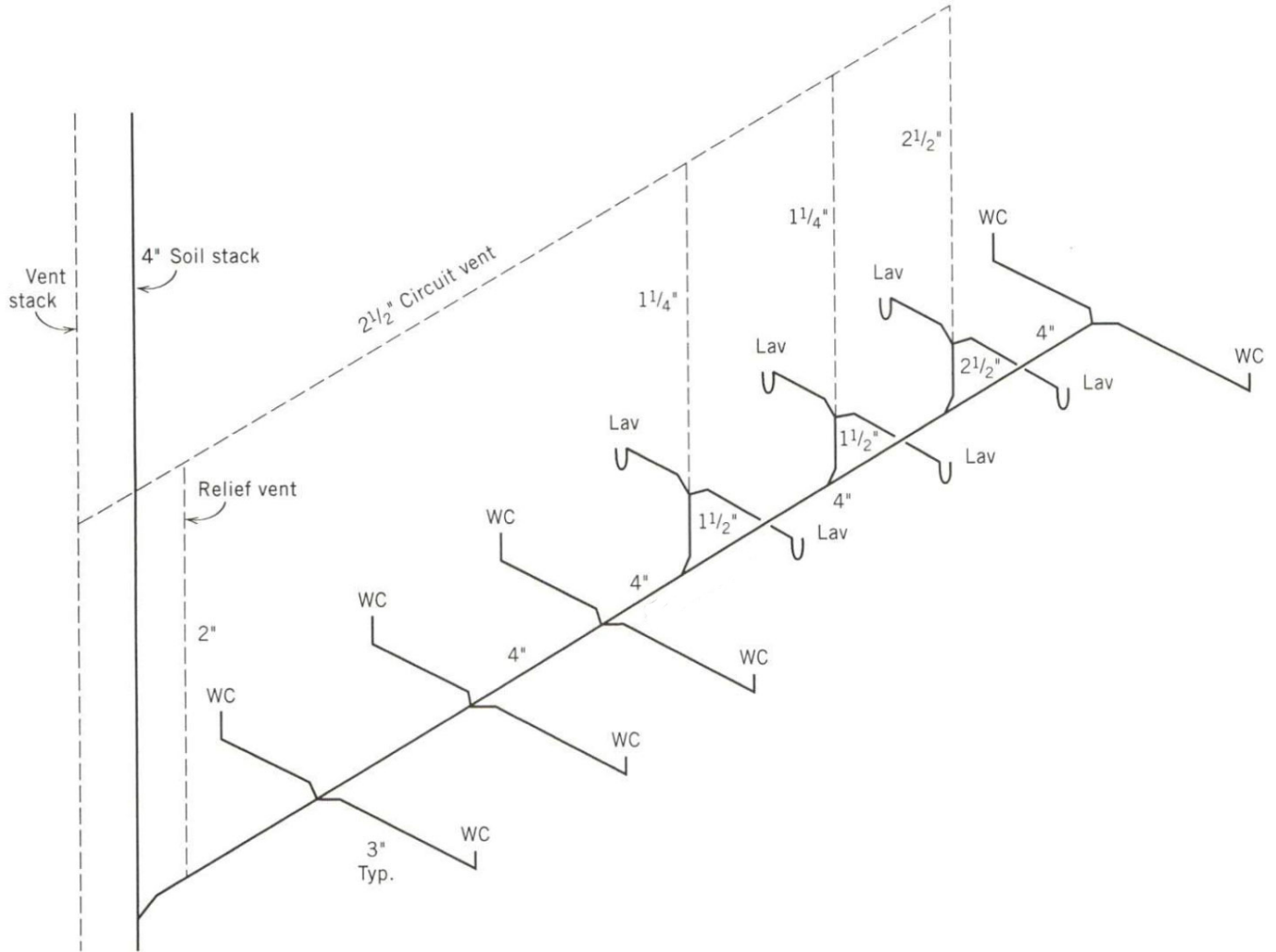
3. The cold-water piping for a public female restroom is shown below. The water closets have flushometer valves.
- a. What table is applicable to determining the WSFU's?

b. Determine the total WSFU for the cold-water load.

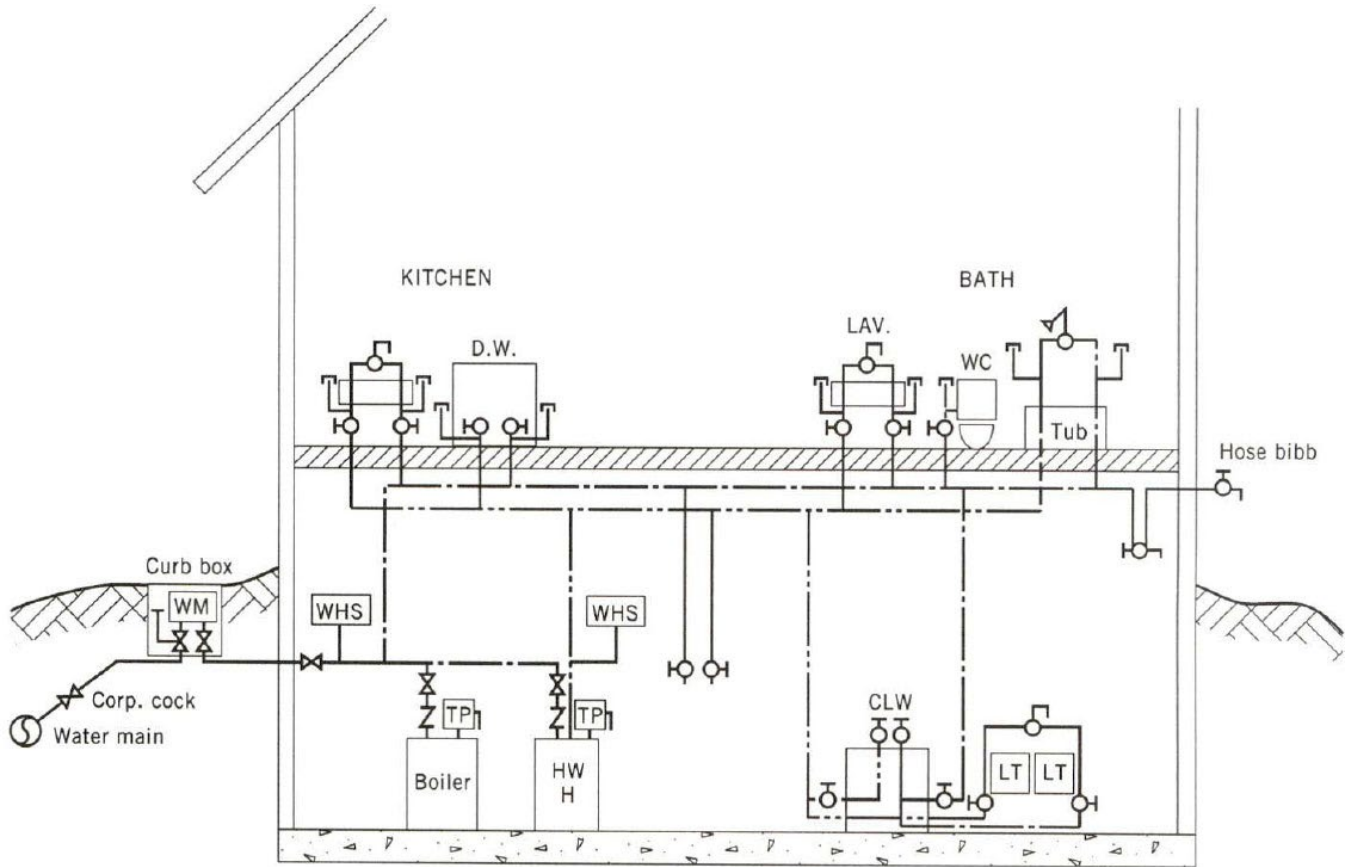


- 6 pts
4. For a public rest room what are the required ADA requirements for:
 - a. Water closet height
 - b. Water closet flush control

- 8 pts
5. Determine the total DFU for the 8 public flushometer toilets and 6 lavatories. What size vent is required for the total DFU and what is the maximum length the vent can be?



10 pts 6. For the basic home shown complete the Hot, Cold, and Combines WSFU table shown below.



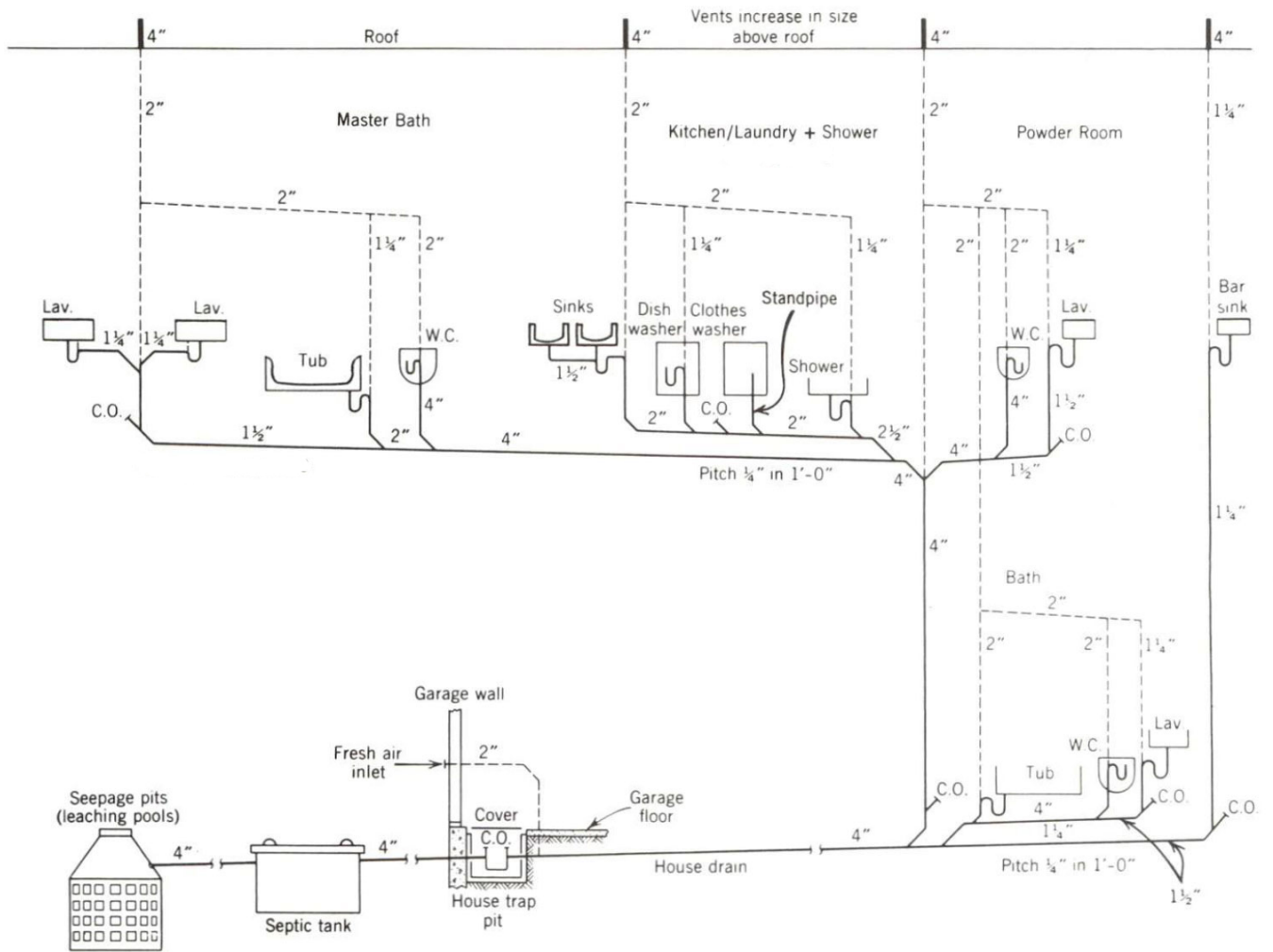
- | Symbols | Abbreviations |
|------------------------|--|
| Gate valve | WM Water meter |
| Check valve | HWH Hot water heater |
| Stop valve | WHS Water hammer suppressor |
| Stop and drain (waste) | TP Temperature and pressure relief valve |
| Cold water | DW Dishwasher |
| Hot water | CLW Clothes washer |
| Capped pipe | LT Laundry tub |

Water Supply Fixture Units							
Fixture	# of Fix.	HOT WSFU		COLD WSFU		TOTAL WSFU	
		EACH	THIS JOB	EACH	THIS JOB	EACH	THIS JOB
TOTALS							

TOTAL GPM _____

10 pts

7. Determine the total DFU for the private residence shown.



- 6 pts
8. The problem of accommodating thermal expansion of piping is particularly important for hot water and steam piping. Amount of expansion depends on:
1. Type of piping used
 2. Temperature change

Linear expansion of a pipe is given by the equation: $\Delta L = C \times L \times \Delta T$

Where,

C = Expansion Coefficient

L = length of pipe

ΔT = temperature differential

Expansion Coefficients (C)

Material	10^{-6} in/in °F
Aluminum	12.8
Steel	6.5
Cast Iron	5.9
Copper	9.3
Stainless Steel	9.9
ABS Acrylonitrile butadiene styrene	35.0
HDPE High density polyethylene	67.0
PE Polyethylene	83.0
CPVC Chlorinated polyvinyl chloride	44.0
PVC Polyvinyl chloride	28.0

In a school building the distance between the hot water boiler and the cafeteria dishwasher is 175 ft. What is the increase in length of the hot water piping from a “resting” condition (shutdown) of 55°F to an operating condition carrying 140°F water using

(a) copper pipe?

(b) CPVC plastic pipe?

- 4 pts 9. Determine the horizontal and vertical drainage pipe size for 5,000 square feet of roof area ($1/8''$ slope per 12'' of pipe) on a building located in Dallas, TX.
- 2 pts 10. For a 4-inch horizontal storm drain, what is the maximum projected roof area if the slope of the drain is $1/4$ -inch per 1 ft of pipe? What table is used to find the answer?
- 2 pts 11. Determine the number of 5'' roof drains required for a roof area of 230,000 sq. ft located in Denver, Colorado.
- 2 pts 12. What is BMP an acronym for? _____
- 2 pts 13. What federal act was passed in 1972 to regulate the discharge of pollutants to receiving waters such as oceans, bays, rivers, and lakes?
- 2 pts 14. What is a system that conveys both sewage and stormwater to sewage treatment plants before the treated effluent is discharged to receiving water bodies called?