## CEA- Quiz Please show all your work.

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

## 1) Water Pressure (11 Points Total)

Owners of a new commercial, 2-story building are complaining about low water pressure inside the building. Your consulting firm has been hired by the municipality to determine if the owners have sufficient pressure. Using the information provided, answer the following questions. **Show all work**.

#### Given:

- Water surface elevation in water supply tank = 641 feet MSL
- Elevation of water supply in front of the building = 499 feet
- Equivalent length of 2 inch copper pipe to first floor = 500 feet
- Equivalent length of <sup>3</sup>/<sub>4</sub>" inch copper pipe to second floor = 175 feet
- Flowrate = 40 gpm
- Hazen-Williams coefficient = 130
- First floor elevation = 520 feet MSL
- Second floor elevation = 530 feet MSL
- Minimum required water pressure inside building = 40 psi
- Assume head losses from water tower to street connection are negligible.

#### Determine:

- a) Static water head in front of the building. Answer in units of feet. [1 points]
- b) Calculate the water pressure in the front of the building. Answer in units of psi. [1 points]
- c) Does the <u>calculated</u> pressure at the street meet the minimum required pressure in the house?
  [2 points]
- d) Head loss between the street and the first floor of the building. Answer in units of feet. [3 points]
- e) Water pressure (Static Water Head and Total Dynamic Head) on the first floor of the building. Answer in psi. [3 points]
- f) Does the <u>calculated</u> pressure on the first floor meet the minimum required pressure inside the building? [1 points]

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**3. Wastewater Slope Calculation** Using the drawing below: 7 pts.



Calculate approximate crown elevation of the existing 14 inch sanitary sewer main. Show this elevation on your sketch.

#### Main crown el. = 763.15 ft. + 14 inches

Α.

Main crown el. = \_\_\_\_\_

Assume that the sewer lateral must connect to the main on 10<sup>th</sup> Street. The horizontal distance from the structure to the existing sewer main is 80 ft.

Determine the maximum sewer lateral pipe invert elevation at the structure foundation and indicate this elevation on your sketch. Assume that the sewer invert must be at least 2 feet below the lowest floor requiring sanitary sewer drainage and that the sewer crown must be below frost depth. Frost depths is 30 inches.

Assume a first floor elevation of 770 ft.

Lateral invert elevation  $\leq$  770 ft - 2 ft = 768 ft.

Frost depth is approximately 30 inches.

B. Lateral crown elevation <= 768 ft. – 30 in = \_\_\_\_\_</p>

Therefore

Lateral invert elevation <= lateral crown elevation - pipe diameter

C. Lateral invert elevation <= \_\_\_\_\_ - 3 in = \_\_\_\_\_

Calculate the slope of the proposed sewer lateral from the structure to the sewer main.

# Sewer Lateral Slope = $\frac{\text{Invert of Lateral at building- Crown Elev. of Main + <math>\frac{1}{2}$ OD ×100% Distance from building to Sewer Main

where  $\frac{1}{2}$ OD = half the outside diameter of the sewer main

- D. Sewer Lateral Slope = \_\_\_\_\_
- **E.** What is the minimum slope allowed for the wastewater pipe? Does your design meet the requirement?