ABC’S OF PLUMBING
OBJECTIVES

- DOMESTIC HOT AND COLD WATER SUPPLY AND DISTRIBUTION
- HEATING DOMESTIC WATER
- SANITARY SEWER
- BUILDING SEWER
- SEWER VENTS
- GREASE WASTE
- WATER CONSERVATION
- QUESTIONS
DIFFERENT USES OF WATER IN A COMMERCIAL BUILDING

- Fire Suppression
- Irrigation
- Drinking
- Restrooms/kitchens
- Cleaning
- Cooling Tower Make Up
SUPPLY SIDE

• The point where the public water supply reaches a property line then becomes the private water supply

• This water then must pass through a water meter, a device with a propeller inside to measure the amount of water being used.

• The water then passes through a backflow preventer, a device that protects the downstream piping from any possible contamination upstream. Backflow preventers need to be tested on an annual basis by a certified tester.

• Potable water, water that is safe for drinking, generally enters the building on the street level or just below

• Depending on how many floors the building has determines if the water supply then needs to be pumped or not

• Every two feet in rise changes the pressure by approximately one PSI. With that, every story of a building changes the pressure by about 5-6 PSI

• With a city pressure of 70 PSI serving a 6 story building would have a pressure of about 30 PSI on the 6th floor. For this situation, the building may need to have a booster pump installed
Water enters the building through a water meter and backflow preventer.
It is then distributed through the building in pipes called Mains, Risers, and branch lines.

Through these branch lines, the hot or cold water travels to the fixtures.
SUPPLY AND DISTRIBUTION

Each floor would normally require a pressure reducing assembly so that the delivered pressure is between 1.5 bar and 4.5 bar.

Drinking water piped directly to lower floors.

Mains water in

Break tank

Packaged water pressure booster sets

Air release and vacuum break valves

Upper floors

Lower floors
DOMESTIC HOT WATER

- Distributing hot water is very similar to how cold water is distributed, you just need to heat it up first
- There are many ways to heat water
  - Gas water heaters
  - Electric water heaters
  - Boilers
  - Heat exchangers
DOMESTIC HOT WATER

The key to hot water is keeping it hot as efficiently as possible.

One way to do this is by having a hot water return system.

It is best to have a temperature sensor or time clock on these lines to keep electrical cost down.
QUESTIONS
SANITARY SEWER

- A sanitary sewer is an underground carriage system specifically for transporting sewage from houses and commercial buildings through pipes to treatment or disposal. Sanitary sewers serving industrial areas also carry industrial wastewater.
**BUILDING SEWER VS BUILDING DRAIN**

- **Building Drain** is all the sewer pipe in a building to 5'-0” outside the building.

- **Building Sewer** is the section of pipe connecting a single property to the public or private sewer.

- **Private Sewer** is a sewer that connects multiple building sewers on one property to one common public sewer.

- **Public Sewer** or **Sanitary Sewer** is the underground carriage system specifically for transporting sewage from houses and commercial buildings through pipes to treatment or disposal plants.
HOW YOUR DRAIN WASTE AND VENT SYSTEM WORKS

- A drain-waste-vent (or DWV) is part of a system that removes sewage from a building and regulates air pressure in the waste-system pipes, maintaining flow. Waste is produced at fixtures such as toilets, sinks and showers, and exits the fixtures through a P-trap, a U shaped section of pipe that always contains water.

- DWV systems maintain neutral air pressure in the drains, allowing flow of water and sewage down drains and through waste pipes by gravity. As such, it is critical that a downward slope of $\frac{1}{4}$ inch per foot be maintained throughout. In some situations, slope out of a building to the sewer cannot be achieved, a special collection pit or Lift station and sewage ejector' pump are needed.
VENT SYSTEM

• The venting system consists of pipes leading from waste pipes to the outdoors, usually through the roof.

• Vents provide a way to equalize the pressure on both sides of a trap, allowing the trap to hold water, which is needed to maintain effectiveness of the trap. Every fixture is required to have an internal or external trap.

• Think of it this way. If you fill a milk jug full of water and flip it upside down, the water chugs. However if you cut a hole in the top it flows out smooth and fast. Your vent system works the same way.
VENT SYSTEM

• A sewer pipe is normally at neutral air pressure. When waste water flows through a pipe, it compresses air in the pipe, creating a positive pressure that must be released or it will push back on the waste stream and downstream trap water seals. As the column of water passes, air must flow in behind the waste stream, or negative pressure results. The extent of these pressure fluctuations is determined by the fluid volume of the waste discharge.

• Excessive negative air pressure, behind a "slug" of water that is draining, can siphon water from traps and plumbing fixtures. A water closet has the shortest trap seal, making it most vulnerable to being emptied by induced siphonage. An empty trap will allow noxious sewer gases to enter a building.

• On the other hand, if the air pressure within the drain becomes suddenly higher than ambient, this positive transient could cause waste water to be pushed into the fixture. This can break the trap seal, which can lead to serious hygiene and health consequences if too forceful. Tall buildings of three or more stories are particularly susceptible to this problem. Vent stacks are installed in parallel to waste stacks to allow proper venting in tall buildings.
PROBLEMS THAT CAN OCCUR IN YOUR SEWER AND VENT

- Blockages
- Cracks
- Clogs
- Bellies
- Pipe Shifting
- Root Intrusion
- I/I & Exfiltration
- Corrosion
- Scaling & Tuberculation
- Pipe Splitting
HOW TO FIND AND FIX THE PROBLEM

- MAINTENANCE
- JETTING
- LINE LOCATING
- CAMERA INSPECTION
- SMOKE TESTING
- DIG UP AND REPLACE
- PIPE LINING
Restaurant and foodservice kitchens produce a lot of waste grease which is present in the drain lines from the various sinks, dishwashers, and cooking equipment. If not removed, the grease will congeal within the sewer and cause blockages and back-ups.

Grease waste lines are installed the same way as your building sewer lines, only commercial kitchen equipment will be connected to these lines.

The waste will then flow to a grease interceptor. This device separates the grease waste from the waste water and lets the waste water flow to the sewer while collecting the grease in a chamber to be pumped out as needed.
WATER CONSERVATION

WHERE DO WE START

✓ Low flow or dual flush water closets
✓ Waterless urinals
✓ Fix or replace leaking faucets
✓ Check your cooling systems, monitor your make-up water use
✓ Check your irrigation systems for leaks
✓ Plant drought resistant plants

Preventative maintenance is essential to keep any building running at its peak efficiency
FOR MORE INFORMATION

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