



Plumbing Systems



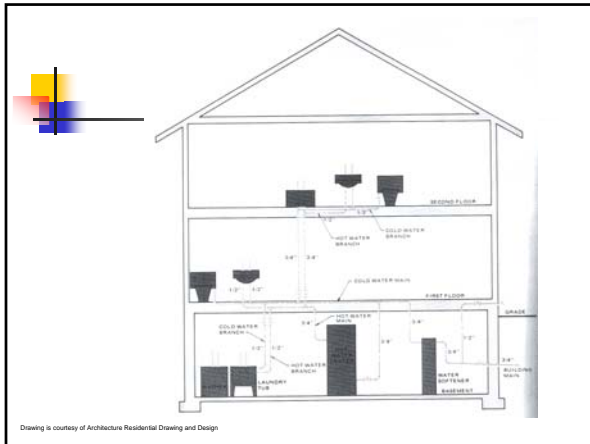
Plumbing Systems

- Public system
- Rural water system
- Private water well



Principal parts of plumbing system

- Water supply
- Water & waste removal
- Fixtures




Additional factors for water supply lines

- Hot & cold lines should be at least 6" apart
- Line size should increase if going to more than one fixture
- For colder climates, lines in exterior walls should be insulated

Additional factors for water supply lines

- Hose bibbs should be frost free
- At least 2 and no more than 1 per exterior wall



Pipes constructed from

- Steel
- Plastic
- copper



Piping Criteria

- Minimum 3/4" main lines
- Minimum 1/2" branch lines
- Shutoff valves on each line and before each fixture
- Air compression chambers



In house water treatment

- Reverse osmosis
- Distillation
- Water softeners
- Activated carbon



Reverse osmosis

- Purifying water by making the water go through a semi permeable membrane by the use of pressure differences on each side of the membrane
- Ex pushing water thru a membrane



Reverse osmosis

- Purified water collected in tank
- Contaminants do not go thru membrane
- 90-99% effective
- Contaminants include
 - Toxic metals
 - Arsenic
 - Nitrates
 - Organic compounds



Reverse osmosis

- Will not work at high concentrations of contaminants
- Lose 3-5 gallons of water for every 1 gallon purified



Distillation

- Electrically heating water to make steam, which is then condensed in a coil to produce distilled water
- Ex. Making moonshine



Distillation

- Removes dissolved solids – salts & heavy metals
- Not effective on VOCs
- Time consuming
- High heat production



Water softener

- Use line pressure to push water through a canister filled with a synthetic resin to perform a process called ion exchange.
- Ex small water softeners for water faucets



Water softener

- Dissolves hard Ca and Mg ions & exchanges it for soft ions in the resin
- Na base softeners could make water "salty"



Activate carbon

- Line pressure forces water thru canister filled with activated carbon granules.
- Ex. Water purifying pitchers



Activate carbon

- Traps contaminants
 - Bad odors & tastes
 - Chlorine
 - Organic chemicals
 - Pesticides
 - Lead

Activate carbon

- High volume
 - 1/3 to 3 gpm
 - Filters will have to be replaced

Determining what type of system to use

- Impurities to be removed
- Amount of water needed
- Cost

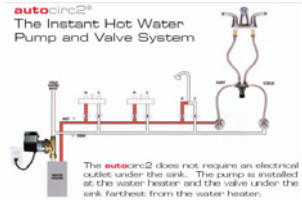
Recirculating hot water



- Used to keep hot water in all lines

Recirculating hot water

- When water cools, cold water transferred to cold water and more hot water added to line



Hot water heater



Washer water hookups



Refrigerator hookups



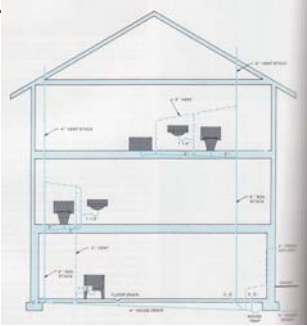
Plumbing lines



Shower installation

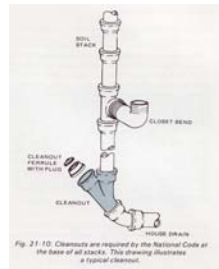


Sewer Lines

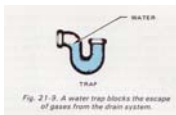


Sewer Lines

- Soil Stacks
 - Sewer lines in house
 - Gravity flow
 - Vents gases out of plumbing line
 - Need cleanouts
 - 1 1/4" < diameter < 4"
 - Copper, metal or PVC



Sewer Lines



- Water trap
 - Does not allow gases to go back up thru drain.
 - On all tubs and sinks and at sewer line exiting the house

Sewer Lines

- Sump pump
 - Needs to be connected to house drain or tile line to outside

