



LECTURE-V
WATER SUPPLY DISTRIBUTION

BUILDING SERVICES-II
(PLUMBING)

Lecturer; Sarko Hassan
Cihan University (2022-
2023)

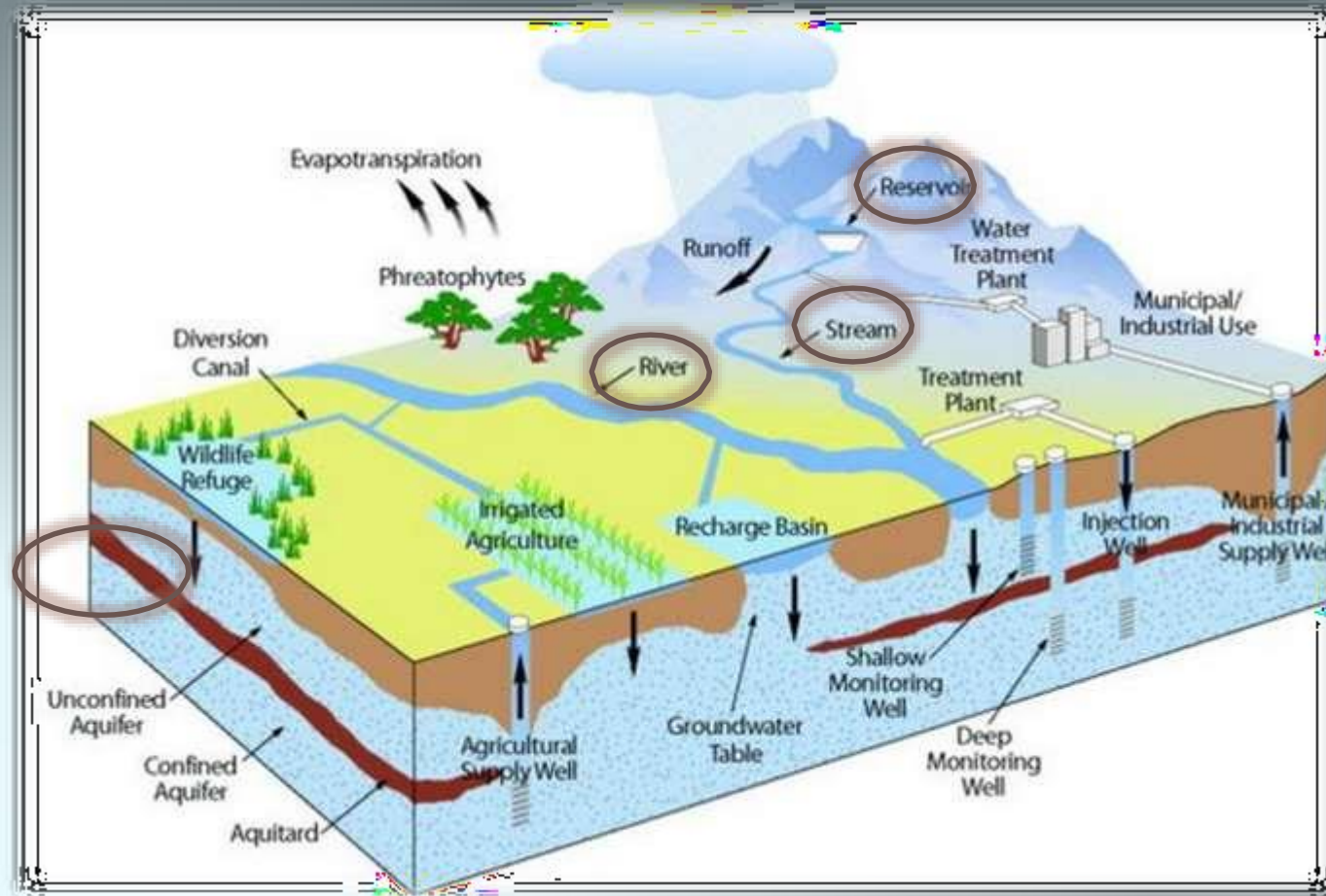
SOURCES OF WATER:

SURFACE SOURCES:

1. Streams
2. Lakes
3. Ponds
4. Rivers
5. Reservoirs
6. Stored rain water and cisterns

GROUND SOURCES:

1. Springs
2. Wells



WATER SUPPLY DISTRIBUTION

- At municipal level
- At domestic level

METHODS OF DISTRIBUTION

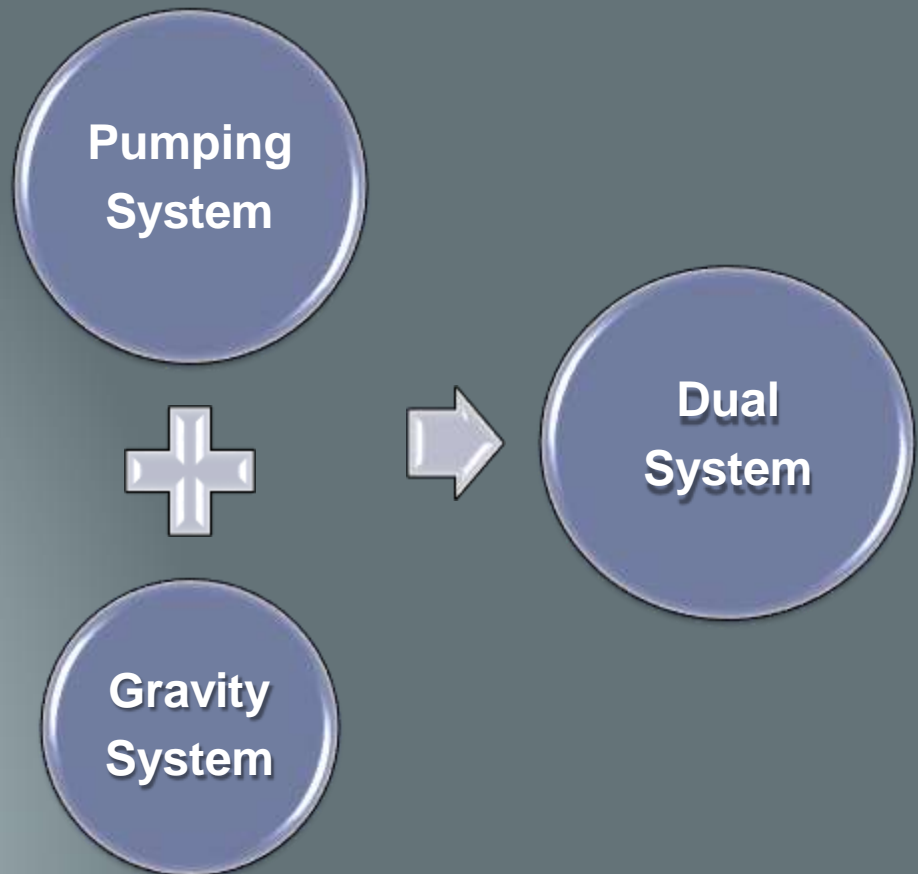
- For efficient distribution system adequate water pressure required at various points.
- Depending upon the level of **source**, **topography** of the area and other local conditions the water may be forced into distribution system by following ways-

DISTRIBUTION SYSTEM:

For efficient distribution it is required that water should reach to every consumer with required rate of flow.

Pressure in pipe line is necessary, which should force the water to reach at every place.

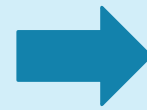
Distribution system are classified as :-



GRAVITY
SYSTEM

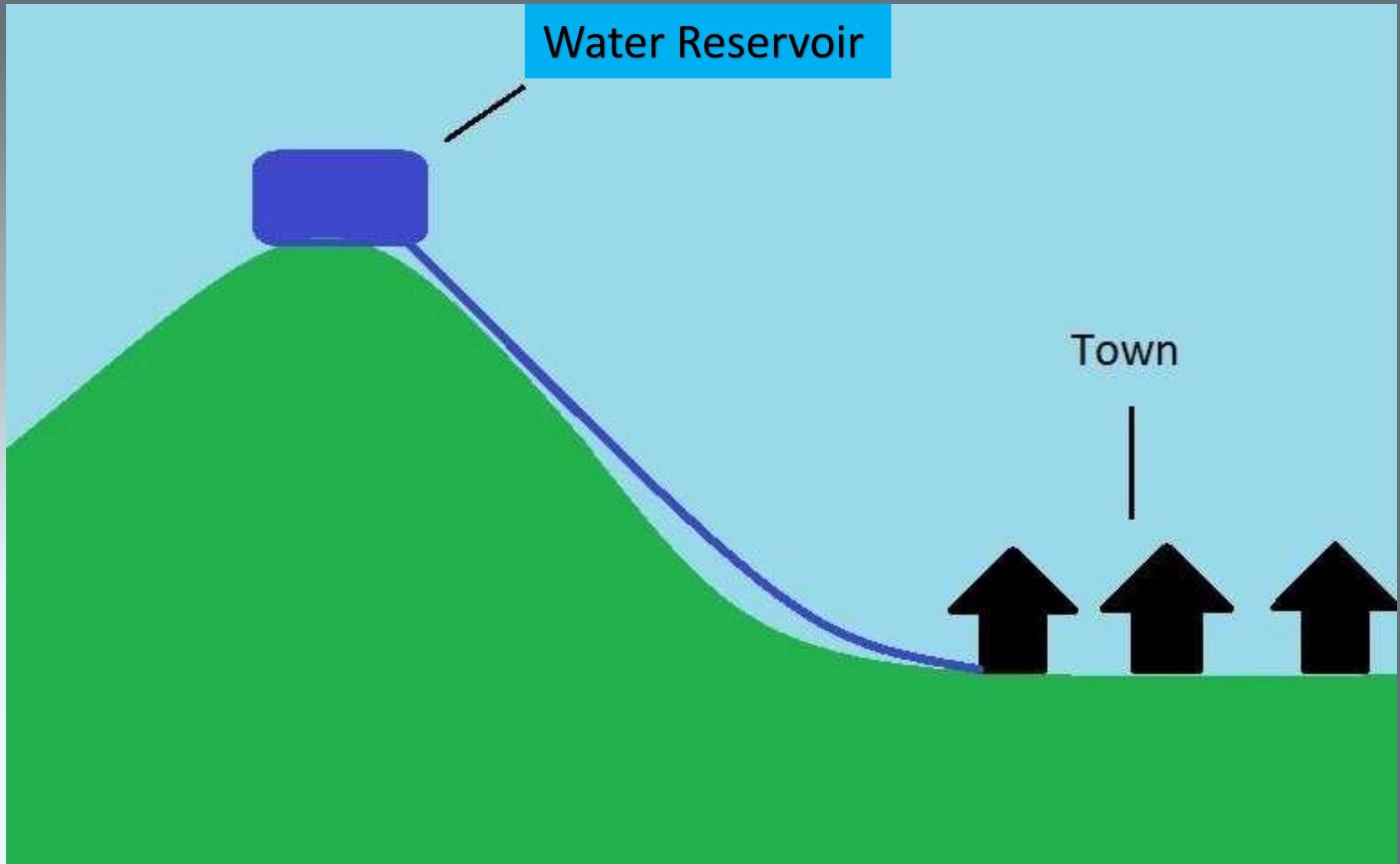


PUMPING
SYSTEM



COMBINED
SYSTEM

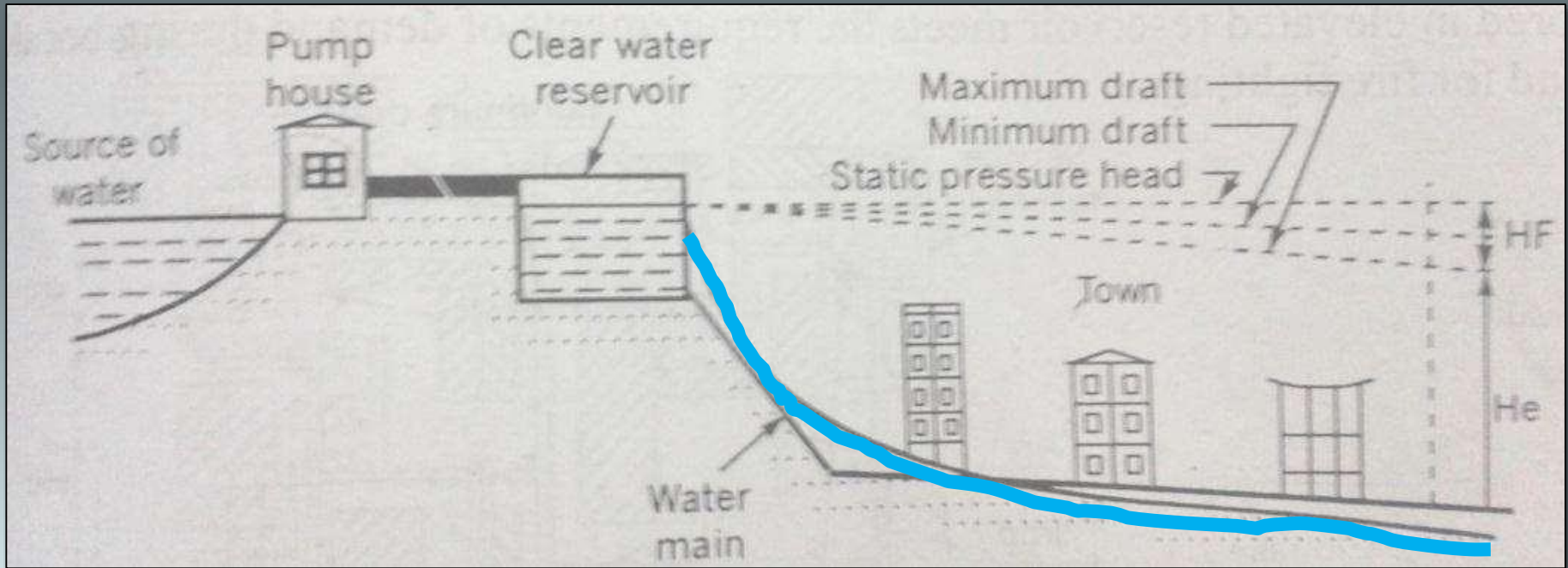
I: GRAVITY SYSTEM



I: GRAVITY SYSTEM

- Suitable when source of supply is at sufficient height.
- Most reliable and economical distribution system.
- The water head available at the user is just minimum required.
- The remaining head is consumed in the frictional and other losses.

I: GRAVITY SYSTEM

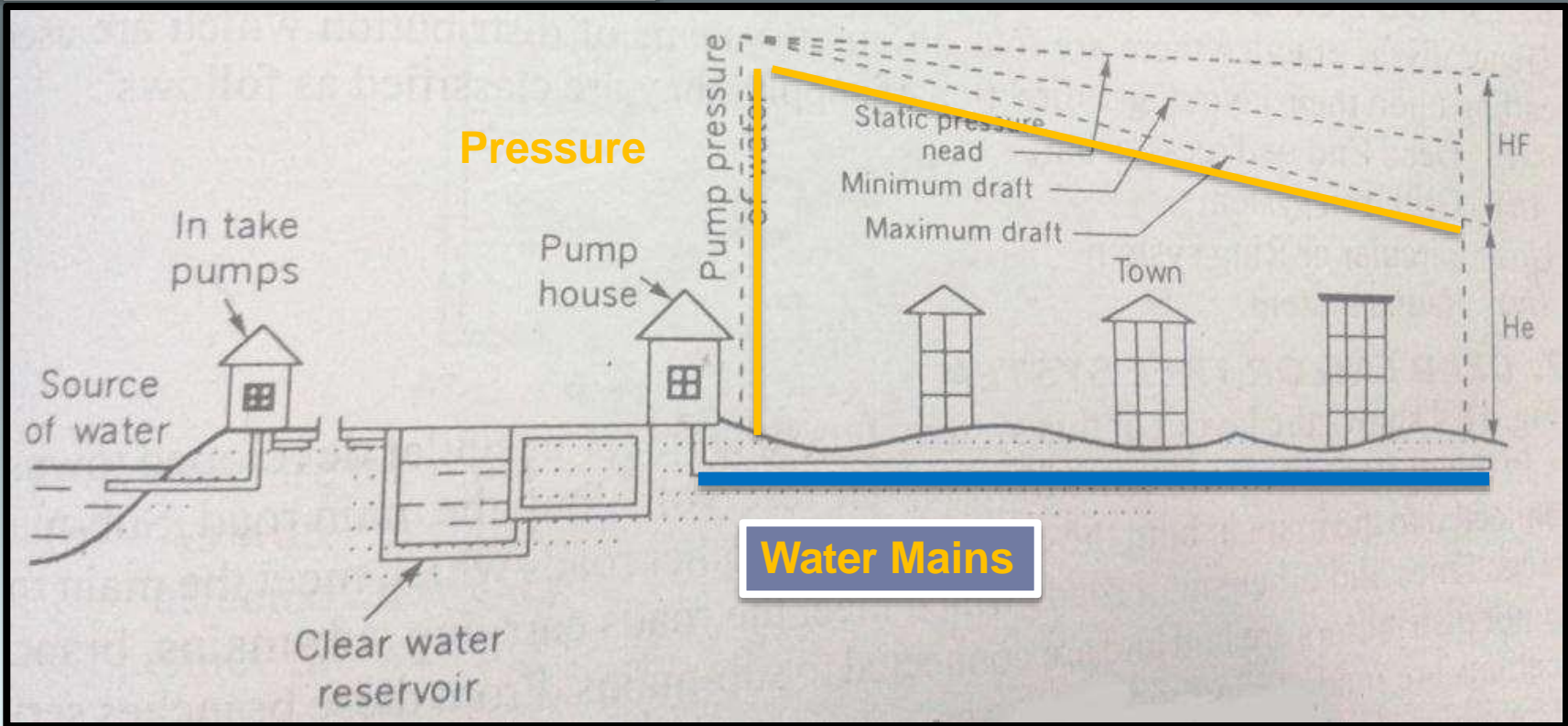


- When some lake, river, reservoir sufficiently **high above** the city area is available.
- Water flows** in mains due to **gravitational pull**, no pumping is required.

II: PUMPING SYSTEM

- Treated water is directly pumped in to the distribution main without storage.
- Also called pumping without storage system.
- High lifts pumps are required.
- If power supply fails, complete stoppage of water supply.
- This method is not generally used.

II: PUMPING SYSTEM



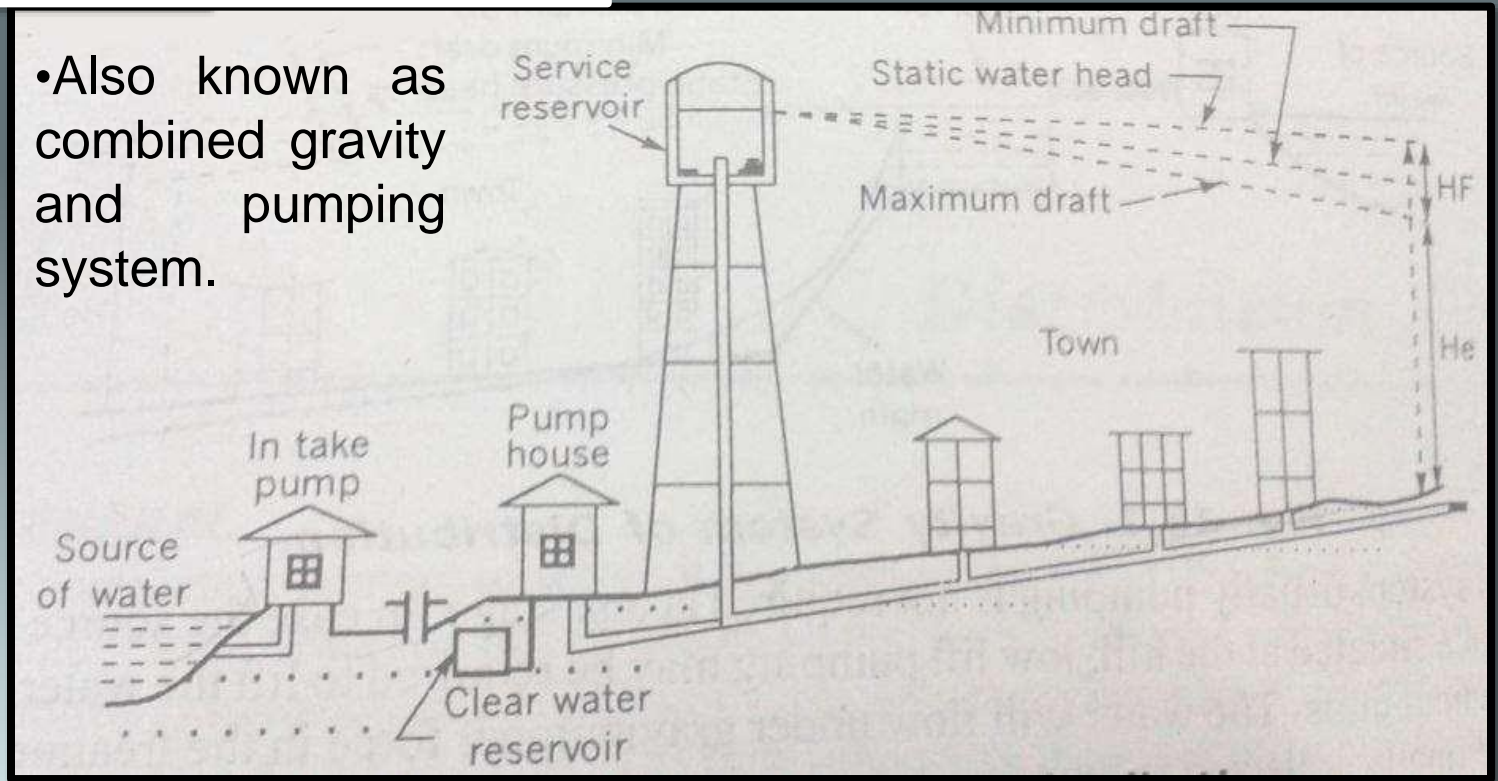
- Water is **directly pumped in the mains**
- Number of pumps are required to work at different time & pressure rate in a day
- If power fails the whole supply will be stopped
- **Pressure maintained** in the pipe line is **by pump**

III: COMBINED GRAVITY AND PUMPING SYSTEM

- Most common system.
- Treated water is pumped and stored in an elevated distribution reservoir.
- Then supplies to user by action of gravity.
- The additional water during low demand periods get stored in reservoir and get supplied during high demand period.
- Economical, efficient and reliable system.

COMBINED (DUAL) SYSTEM

- Also known as combined gravity and pumping system.



- Pump is connected to the mains as well as to the elevated reservoir
- when less water demand - **water is stored in elevated reservoir**
- With increase in water demand – **water comes from both pumping station as well as reservoir**
- More reliable and economic
- Require uniform rate of pumping
- During power failure and fire fighting water stored in reservoir can be used

PLUMBING

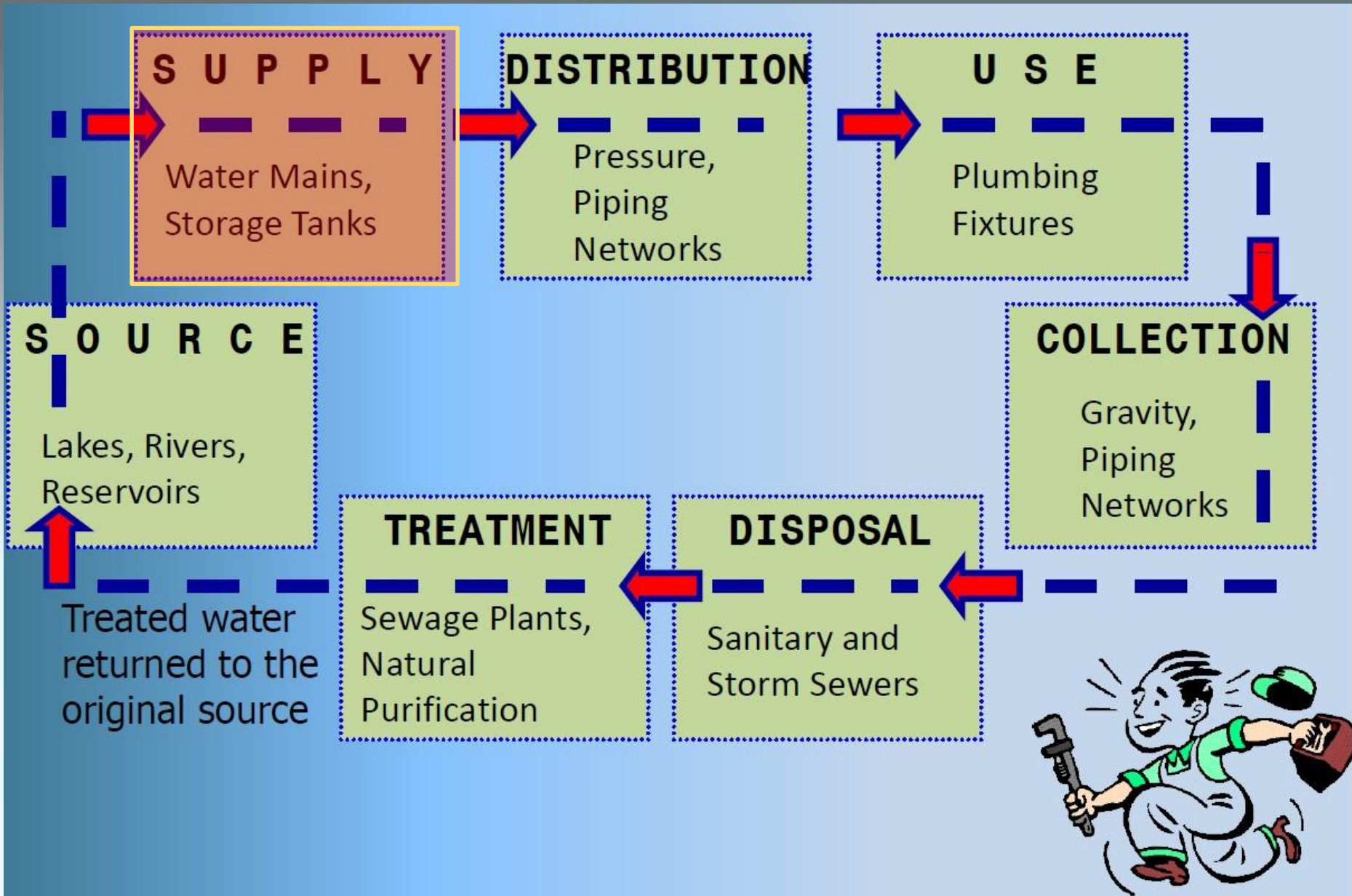
- Is the art and technique of **installing pipes, fixtures & other apparatuses** in buildings & for bringing the water supply, liquids, & removing them;
- from the Latin **plumbum** for **lead** as pipes were once **made from lead**.
- refers to a **system of pipes and fixtures installed in a building** for the **distribution of potable water** and the **removal** of waterborne wastes.

PLUMBING SYSTEM

- System includes all **potable water supply** and **distribution pipes**, all plumbing **fixtures** and **traps**;
- all **sanitary** and **storm drainage** systems; eg. roof drains and down spouts
- and all building **drains** and **sewers**, including the joints and connections
- Also fuel **gas piping**; **water heaters** and **vents** for same.



PLUMBING CYCLE



Water Supply and Distribution System

Definition

• **Carries water** from the **water source, street main** or to the **building** and to **various points** in the building at which **water is used**.

Water Supply Systems

- Cold water system
- Hot water system

Cold water system :

- Cold water system provide water for the following purposes.
 - **Drinking purpose**
 - **Cooking purpose**
 - **Sanitary purpose**
 - **Washing purpose**
 - **Gardening**

Types Of Cold Water System

Two Types

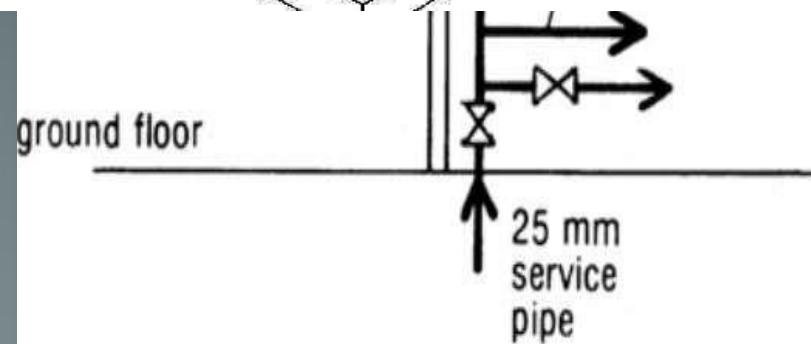
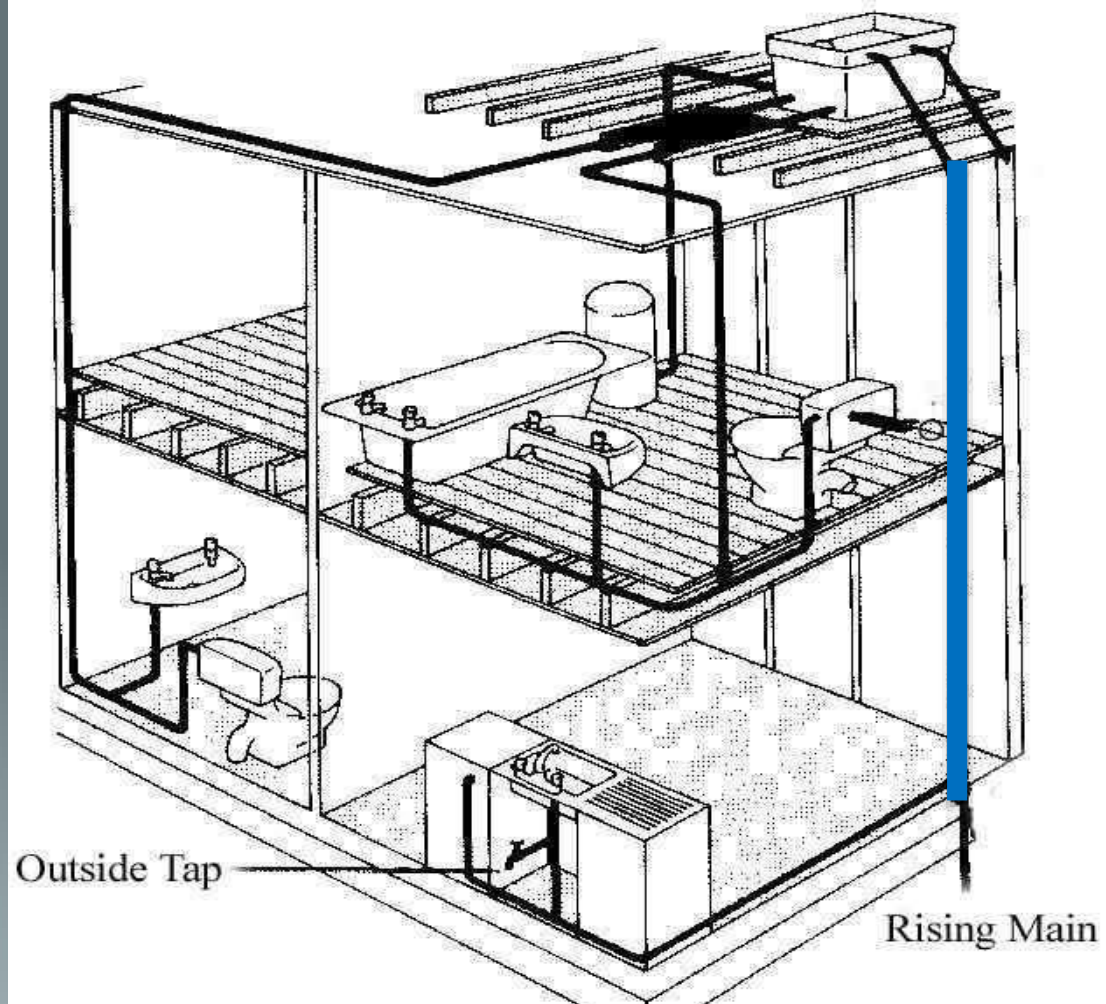
1. Direct system
2. Indirect system

Direct Water Supply System

- Water is supplied **direct from mains to fixtures**

Indirect Water Supply System

- Water going to **overhead tank** and then the water is **supplied to different floors by gravity**



Direct system of cold-water supply.

Direct Water Supply System

Advantages:

- **saving in pipe work** especially in multistory buildings.
- This is due to cold water distribution pipe from the tank being omitted
- Fresh Drinking water may be obtained at any point

Disadvantages:

- There is a danger of foul water from the sanitary fittings being siphoned back into the main water
- During peak periods there is a tendency for the lowering of pressure
- If there is a mains burst there is **no store of water**

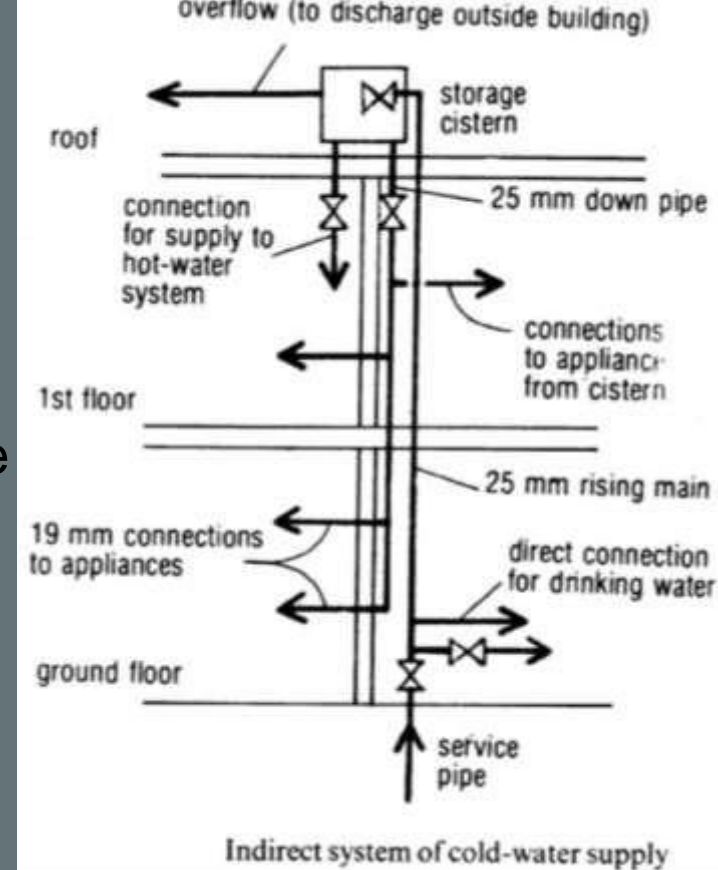
Indirect Water Supply System

Advantages:

- There is no risk of back siphon age with this system
- There is no tendency of pipe bursting due to the low pressure in the pipe work
- In case of an interruption in the mains supply there is an adequate store of water

Disadvantages:

- Longer pipe runs are required
- A larger storage tank is necessary
- Fresh Drinking water is only available at the kitchen sink (or **single point**)



PARTS OF WATER DISTRIBUTION SYSTEM

SERVICE PIPE

The pipe from the **water main** or **other source of potable water** supply to the water distribution system of the building served.

DISTRIBUTION PIPE/ SUPPLY PIPE

A **pipe** within the structure or on the premises which **conveys water** from the water service pipe to the **point of utilization**.

RISER

A water supply pipe that extends one full story or more to convey water to branches or to a group of fixtures.

FIXTURE BRANCH

The water supply pipe between the fixture supply pipe & the water distributing pipe.

FIXTURE SUPPLY

A water supply pipe **connecting the fixture with the fixture branch**.

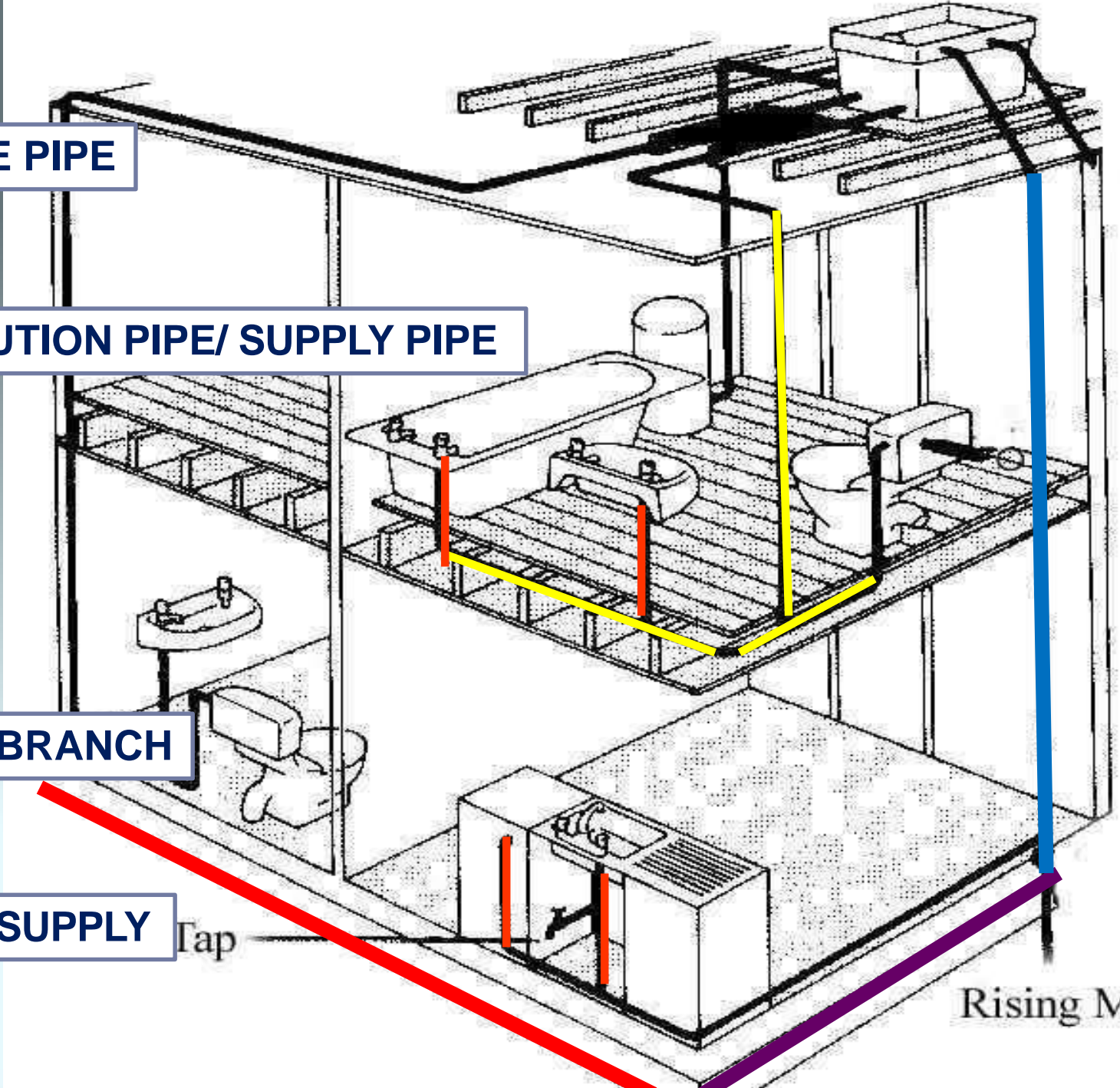
SERVICE PIPE

DISTRIBUTION PIPE/ SUPPLY PIPE

RISER

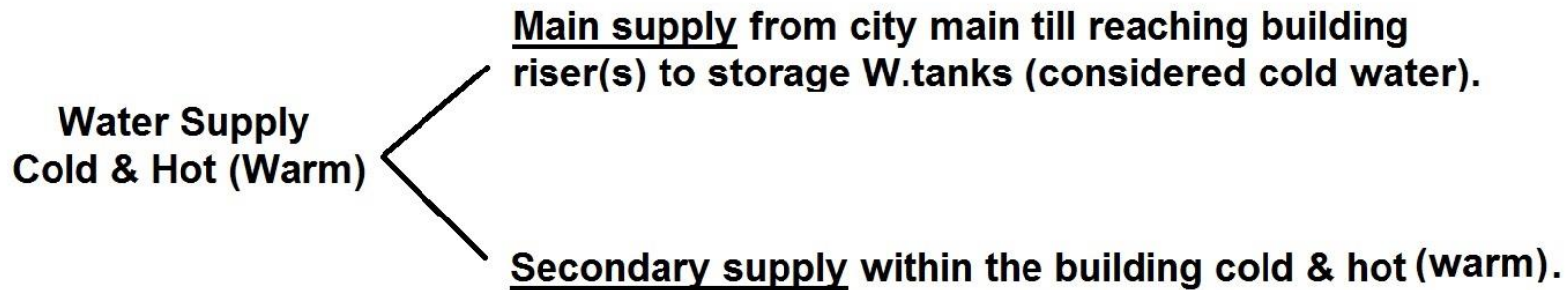
FIXTURE BRANCH

FIXTURE SUPPLY



Tap

Rising Main



W.S. piping (C & H) in the building should be treated against heat gain and loss (as well as rustication, breaking, rodents,...etc,)specially in outdoor places in the building.

How to reduce heat loss or gain:

- 1- By architectural design (passive solutions).**
- 2- By reducing length of pipings (passive solutions).**
- 3- By using thermal insulation, covering of piping, tanks,...etc,(passive & active solutions).**

Passive treatments means without direct consuming of energy.

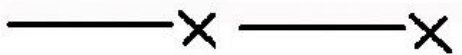
Active treatments means with direct consuming of energy.



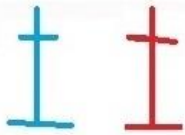
Cold water pipe within building



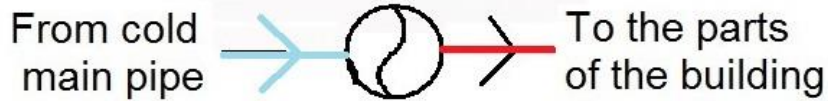
Hot water pipe within building



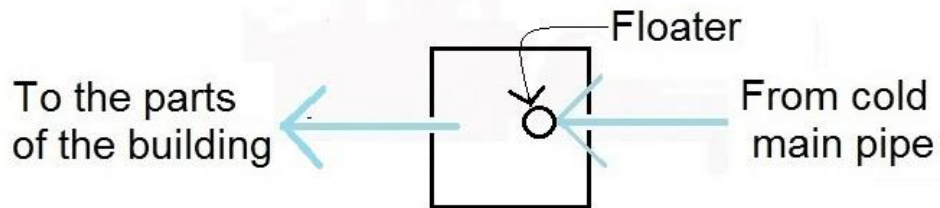
Main water supply pipe from city main



Water tap (hot or cold)



Water heater



Water tank



Water pump



Valve

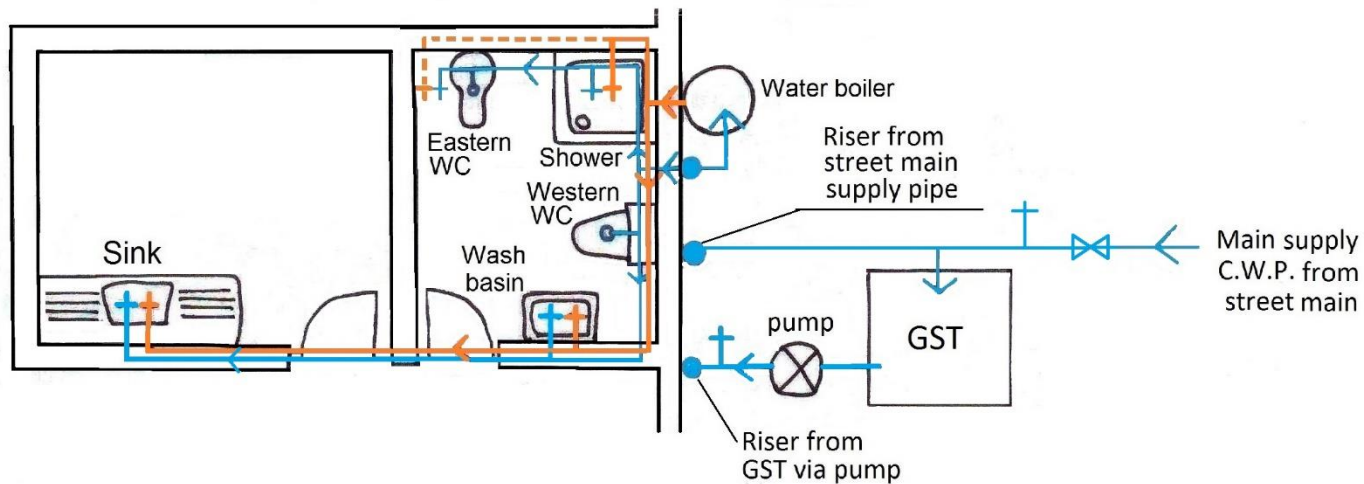
For water supply distribution in buildings, there are two main systems:-

- 1- The simple system: works by initial pressure of main city water supply, gravity, pressure by water heater(s) and certain water rising pump(s) within the building for both cold and hot water, but only to deliver C & H water to the fixtures & taps without any recirculation of water within the indoor WS piping net.**

- 2- More complicated system: called " Pumping system " which basically includes 1 above, but works by certain indoor pump(s) with auxiliary equipment to deliver water to the fixtures and taps with continuous water recirculation in indoor WS piping net, particularly for warm (hot) water.**

- 3- For a small or medium house, main cold water supply pipe from city main should not be less than 1/2" 12mm, 3/4" 18mm or 1" 25mm and should serve the fixtures either directly by feeding them directly or indirectly by feeding them via the cold water from roof water storage tank(s).**

Water supply for part of a small building - PLAN The simple system



- Average daily consumption of water (hot & cold) for one person is 100-160 L, i.e: at a rate of 130L per day.
130L = 0.13m³
- Roof water storage tank capacity should be enough for 2 days of W consumption, i.e. storage per person is 260L or 0.26m³.

THANK YOU