## 3.4 WATER DISTRIBUTION SYSTEM

### Principles of design of water supply in Buildings:

- The design of pipe should be made so that there is no contact between the lines feeding to the cistern or any such other appliance with those feeding water for human consumption.
- Pipe network should be completely water tight and also remain undamaged either by traffic loads, vibrations or temperature and any strains of buildings.
- Pipe network in the premises should be optimum discharge of water is obtained consistent with economy. The system should be free from water hammer, corrosion and should also look aesthetic.
- Plumbing fixtures and appurtenances should be supplied with water in sufficient volume and at pressures adequate to function satisfactorily and without undue noise under all circumstances.
- The pipe network should be laid and fixed so that it shell be accessible at any time for attending to damages, leakages etc.
- The pipe network should be of adequate size to give the desired rate of flow
- The pipe network should be laid and fixed that it does not pass by the side of any sewage line or refuse drain nor does it pass through any field of foul ground where dirt or city have been deposited and manure dumps
- The pipe network should be divided into sections to facilitate repairs. These sections Should be separated by valves in order that a section can be isolated for repairs keepingthe rest of the distribution.
- The methods of joining pipe should be such as to avoid water loses.
- Whenever the pipes are bent it should be so made that these are not likely to materially diminish or alter cross section.
- The piping should be so laid that air locks do not occur and it should be possible toflush out the network from time to time.
- In the building if a provision is required to be made for storage of water on account of

1. In the interruption of supply

2. To maintain a reserve supply

3. To regulate discharge in the mains

4. To maintain a reserve for firefighting arrangements,

a tank for storage of water should be provided which should be watertight and also should be of sufficient thickness and capacity.

In the case of underground tanks, the contamination of stored water on account of above groundflow and due to seepage of underground water should be avoided.

Whenever underground tanks are required for firefighting purposes, the same should be approachable easily by fire tenders. The water which is required for firefighting is so provided that every day it gets renewal through an inflow of fresh water supply.

Lead piping should not be utilized anywhere in the domestic water supply system. Polythene and PVC pipes should not be installed near hot water pipes or near any source of heat.

The dead ends in the pipe lines should be avoided to the extent possible.

## 3.4.1 HOUSE SERVICE CONNECTION

Water supply to a house begins with connection of the service pipe with municipal water mains. The connection sequence comprises

a. Ferrule
b. Gooseneck
c. Service pipe
d. Stop cock
e. Water meter

To get water supply from municipalities connection consists of the following

a. Ferrule:

A ferrule is a right angled sleeve made of brass or gun metal and is joined to a hole drilled in the water main to which it is screwed down with a plug.

b. Goose Neck:

Goose neck is a small sized curved pipe made up of flexible material and is about 75cm in length forming a flexible connection between the water main and the service pipe.

c. Service Pipe:

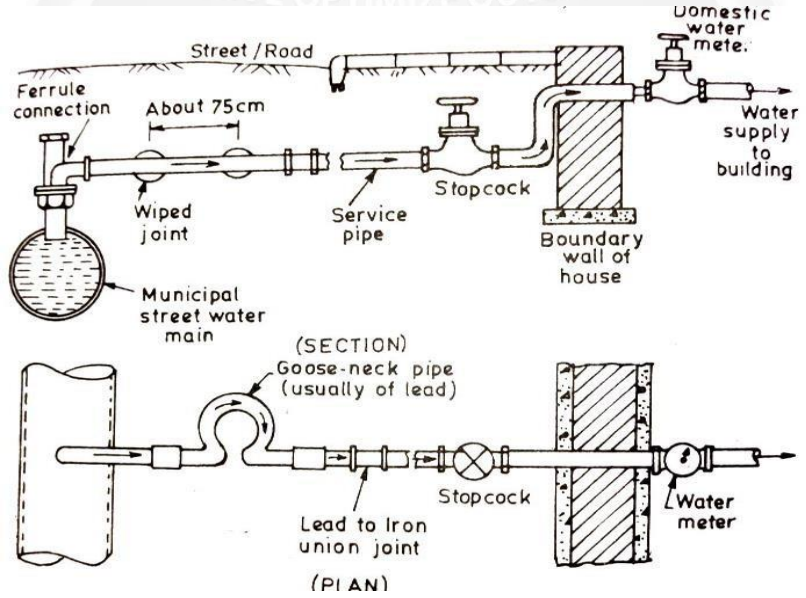
It is a galvanised iron pipe of size less than 50mm dia. It should be laid in under ground in a trench in which no sewage or drainage pipe is laid. The service pipe which supplies water to building through the municipal mains is connected to the main through goose neck and ferrule.

d. Stop Cock:

The stop cock is provided before the water enters the water meter in the house. It is placed in a suitable masonry chamber with a removable cover and is fixed in the street close to the boundary wall in an accessible station.

e. Water Meter:

It measures and records quantity of water consumed in the house.



## 3.4.2 LAYING OF PIPELINE

The laying of pipeline should be done according to the following stages

1. Detailed map preparation.
2. Centre line marking.
3. Unloading.
4. Storing.
5. Cutting.
6. Trenches.
7. Laying
8. Back filling and tamping

1. Detailed map preparation.
   - Map showing all roads, cable lines, lanes etc., is prepared.
   - Pipe line with size and length is marked.
   - The position of existing pipe lines, curb lines, sewer lines will also be marked
2. Centre line marking.
   - Transformation from map to site.
   - Stakes driven at 30m interval on straight line .
   - stakes will be 7-15m on curves.
3. Unloading.
   - Up to 60kg – 2persons .
   - Above 60 kg – wagon/truck by holding it in rope and slides over planks set not steeper than 45°.
   - One pipe at a time.
   - It may use carriers or be dragged or rolled along hard surfaces
4. Storing.
   - To avoid damage.
   - It should be stored horizontaly .
   - It should be stored in layer

5. Cutting.
    - Mark with a chalk at the point o cut.
    - Cut with carpenter's saw or hack saw .
    - It must be a proper uniform cut.
6. Trenches.
    - It may be done either hand or machine.


    - It must be done with required gradient and depth.
    - When it is under a road way minimum cover of 1m is recommended.
    - Width at the base not less than 200mm on both side of the pipe.
    - Width may extend for joints .
7. LAYING
    - Pipes shall be lowered into the trenches by means of suitable pulley blocks , shear legs, chains, ropes .
    - in no case the pipe shall be rolled and
8. Dropped into the trench.
    - Spigot of one pipe is carefully centred into the socket of other pipe.
    - In some clay soil (black cotton soil) envelope of 10 cm minimum tamped sand shall be made around the pipe line.

9. Back filling and tamping

- Back filling must be done carefully to avoid damages in pipe form fallingof boulders, lifting of pipes from sudden floods.
- Soil under and around the pipe line is tamped to give continuous supportsto the pipe.
- It may be done by tamping rod or water consolidation.
- The initial backfill done for 10 cm thick.

## TESTING OF PIPE:

Step 1: From section to section. One section at a time.

Step 2: Downstream valve is closed, upstream valve is opened to fill the water.

Air valves must be properly operated during filling.

Step 3: Both the sluice gates are closed.

Step 4: Pressure gauge is fitted along the length of the pipes at holes which is leftfor this purpose.

Step 5:Section is connected to the delivery side of the pump through a smallBy- pass valve to develop pressure in the section.

Step 6: By-pass valve is closed.

Step 7: It kept under pressure for 24 hours and inspected for possible defects

,leakages and joints.

Step 8: Pipe line is disinfected . Add chlorine 50mg/l for 12 hours and the pipe isemptied and flushed with treated water.

## 3.4.3 DISTRIBUTION SYSTEM

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

1. Gravity system
2. Pumping system
3. Combined gravity and pumping system

Gravity system..

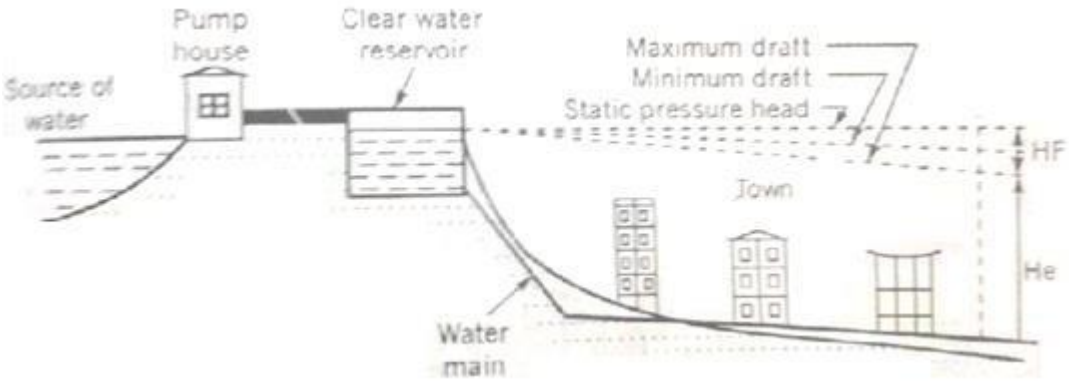
a) Suitable when source of supply is at sufficient height.

b) Most reliable and economical distribution system.

c) The water head available at the consumer is just minimum required.

d) The remaining head is consumed in the frictional and other losses.

e) Water flows in mains due to gravitational pull, no pumping is required.




Pumping system…

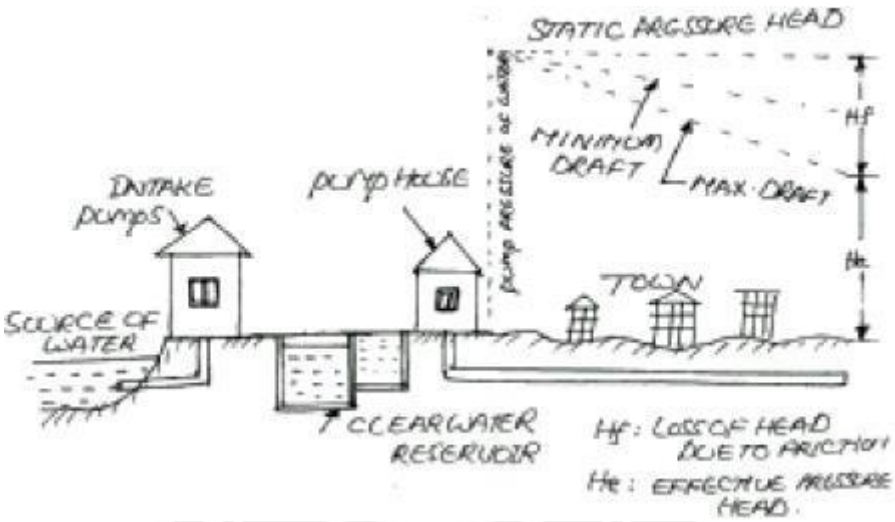
a) Treated water is directly pumped in to the distribution main without storing.

b)Also called pumping without storage system.

c)High lifts pumps are required.

d)If power supply fails, complete stoppage of water supply.

e)This method is not generally used.




Combined gravity and pumping system..

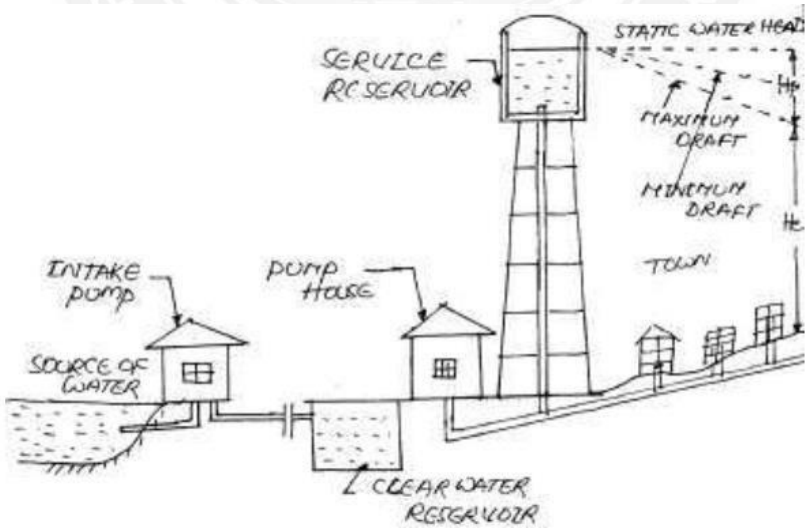
a) Most common system.

b) Treated water is pumped and stored in an elevated distribution reservoir.

c) Then supplies to consumer by action of gravity.

d) The excess water during low demand periods get stored in reservoir and get supplied during high demand period.

e) Economical, efficient and reliable system.




## Requirements of good Distribution System:

**Water Distribution Systems**

The purpose of distribution system is to deliver water to consumer with appropriate quality, quantity and pressure. Distribution system is used to describe collectively the facilities used to supply water from its source to the point of usage.

## Requirements of Good Distribution System

1. Water quality should not get deteriorated in the distribution pipes.

2. It should be capable of supplying water at all the intended places with sufficientpressure head.

3. It should be capable of supplying the requisite amount of water during fire fighting.

4. The layout should be such that no consumer would be without water supply, duringthe repair of any section of the system.

5. All the distribution pipes should be preferably laid one metre away or above thesewer lines.

6. It should be fairly water-tight as to keep losses due to leakage to the minimum.