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CHAPTER – 4
WASTE WATER MANAGEMENT

SYNOPSIS:

Performance criteria for waste water management system, house drainage plan, classification of traps – P-trap, Q-trap, S-trap, floor trap, gully trap, intercepting trap, grease trap,
Principle of efficient drainage system.

WASTE WATER MANAGEMENT

What is Wastewater?

- Wastewater is a term that is used to describe waste material that includes industrial liquid waste and sewage waste that is collected in towns and urban areas and treated at urban wastewater treatment plants.

The goal of waste water management is to clean and protect water. This means that water must be clean enough so that it can be used by people for drinking and washing, and by industry for commercial purposes. It also must be clean enough to release into oceans, lakes, and rivers after it has been used.

Objectives of Wastewater Treatment

- To kill the pathogens
- To improve the quality of waste-water
- To avoid unhygienic conditions
- To protect the aquatic life from the toxicity   wastes
- To make the waste water usable for agricultural, aquaculture etc

There are three constituents and interrelated aspects of waste water management.

1.Collection of Wastewater

Collection of domestic wastewater is best achieved by a full sewerage water drain age system. Unfortunately this method is most expensive and there is relatively few communities in hot climate which afford it. A modern hygienic method of night soil collection is the only realistic alternative.

2.Treatment of Wastewater

Treatment is required principally to destroy pathogenic agents in sewage or night soil and to encore that it is suitable for whatever re-use process is secreted for it.

3.Re-use of wastewater (Recycling of wastewater)

The responsible re-use of night soil and sewage effluent is aqua culture and crop irrigation can make a significant contribution to a community food supply and hence it's general social development. The best example is china where over 90% of waste after treatment is applied to land

i.Health Criteria:
Pathogenic organisms should not be spread either by direct contact with right soil or sewage or indirectly via soil, water or food. The treatment chosen should achieve a high degree of pathogen destruction.

ii.Re-use/Recycle Criteria:
The treatment process should yield a safe product for re-use, preferably in aquaculture and agriculture.

iii.Ecological criteria:
In those cases land the should be considered exception when the waste cannot be re-use, the discharge of effluent into a surface water should not exceed the self-purification capacity of the recipient water.

iv.Nuisance Criteria:

The degree of odor release must be below the nuisance threshold. No part of the system should become aesthetically offensive.

v.Cultural Criteria.

The methods chosen for waste collection, treatment and re-use should be compatible with local habits and social (religious) practice.

vi.Operational Criteria:

The skills required for the routine operation and maintenance of the system components must be available locally or are such that they can be acquired with only minimum training.

vii.Cost criteria:

Capital and running costs must not exceed the community's ability to pay. The financial return from re-use schemes is an important factor is an important factor in this regard. However, no one system completely satisfies all these demands. The problem becomes one of minimizing disadvantages.

House Drainage System

The W.C, Bathrooms, Sinks, Wash basins, etc. are important components of a house. The occupants of the house make use of the above components and as a result of that there is a formation of waste water. The Waste water from W.C, bathrooms, sinks and wash basins is to be properly disposed in to the muncipal sewers. It is therefore necessary to construct a system of conveyance of wastewater from W.C, bathrooms, kitchens and washbasins and disposal to the muncipal sewer. This system is known as house drainage system
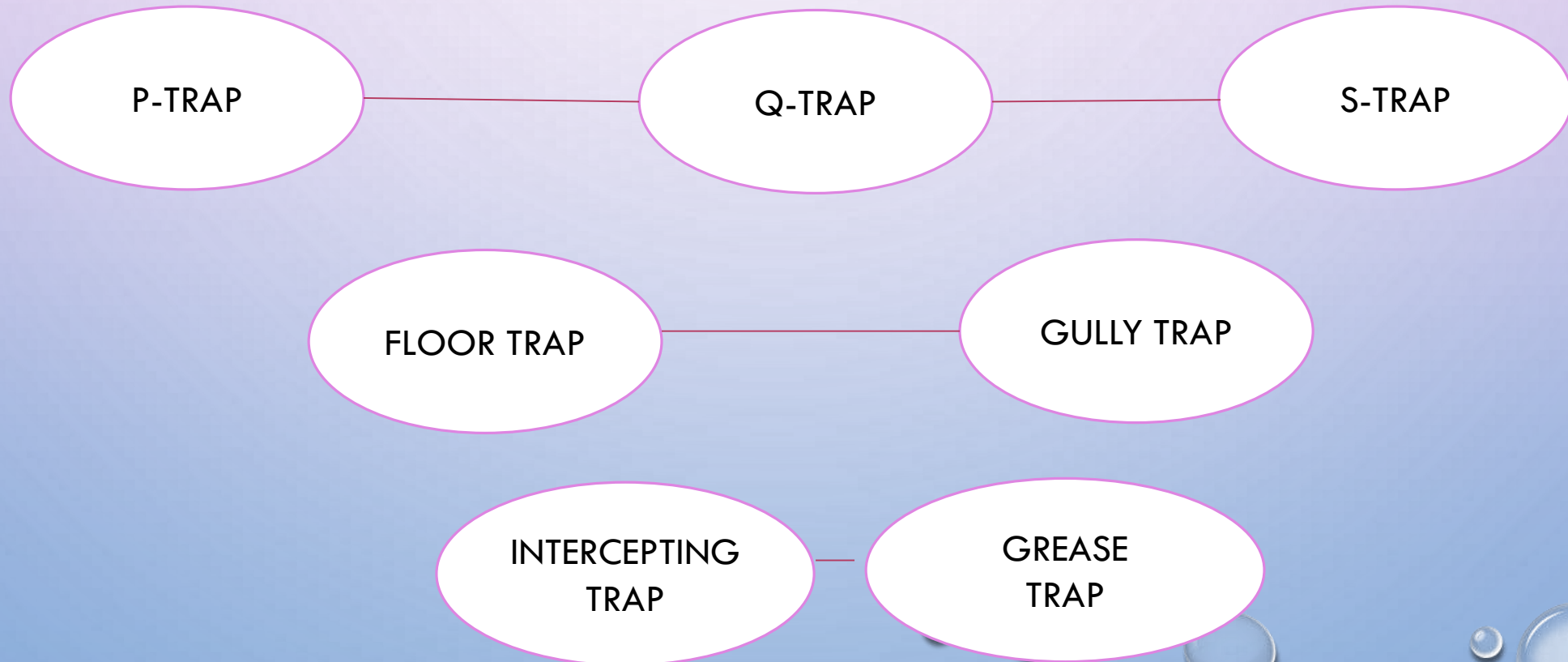
House Drainage System
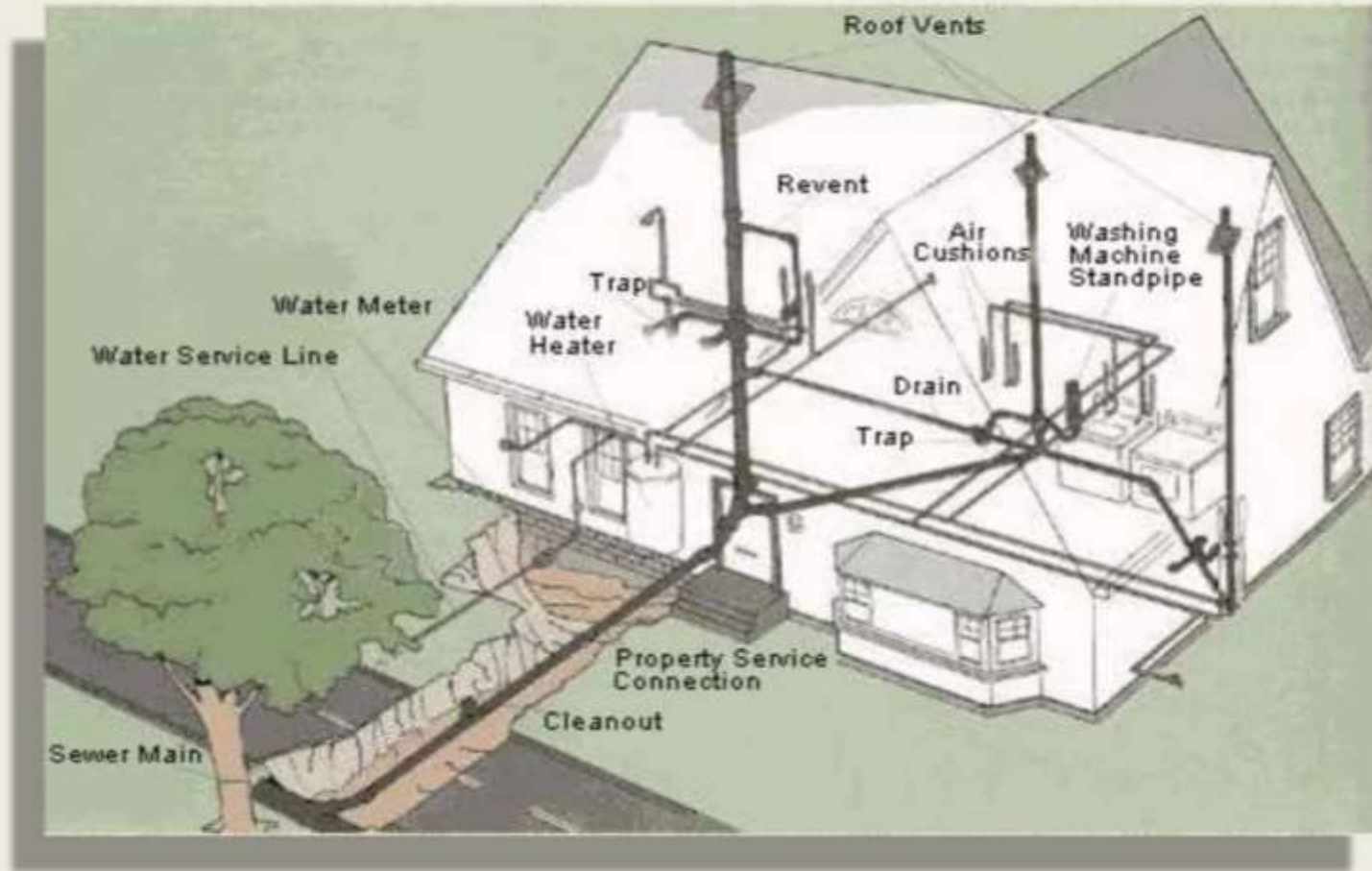
Definition of Terms

- **Sullage:** The Wastewater coming from bathrooms and kitchens which does not contain fecal matter is known as sullage.
- **Plumbing System:** It is entire system of pipe line for providing water supply to the building or it is a system of pipes for disposal of wastewater from the building.
- **Sewer:** A pipe carrying sewage/ wastewater is called sewer.
- **Soil Pipe**: It is pipe carrying sewage from W.C.
- **Waste Pipe:** It is a pipe carrying sulluge from bathrooms, kitchens, sinks, wash basins, etc.
- **Sewerage System:** A system of sewers of different types and sizes in a town collecting wastewater from the town and carrying it to the wastewater treatment plant.

Traps

Traps are **the fittings placed at the ends of the Soil pipes as well as waste pipes to prevent the entry of foul gases from the drains into the interior of the houses or buildings**.

Classification of traps

- P-TRAP
- Q-TRAP
- S-TRAP
- FLOOR TRAP
- GULLY TRAP
- INTERCEPTING TRAP
- GREASE TRAP

Role of Plumbing Traps

- Plumbing trap is a part of the drainage system. It is developed or designed in such a way that it retains a small quantity of waste water from the discharge, of fitting to which it is attached, as a barrier to prevent foul gases or air entering in the building.
- Plumbing traps are an important component of the sewage system. They prevent entry of foul air, insects and parasites from the sewers into the building and resist the spread of diseases. Traps are constructed, so that they retain a body of water which acts as a water seal.
- Traps should be of the self-cleaning type. They should generate enough speed from the available flow to create a self-cleansing effect, i.e. a smooth finish and a full identical opening.

P-traps

They are **U-shaped pipes in toilets and underneath sinks**. P-traps hold a small amount of water that prevents sewer gases from rising up into your home.
The most critical task of the p-trap is **to prevent noxious gases such as methane from making their way into a home**. These traps also allow homeowners to quickly and easily recover small items that fall down the drain.
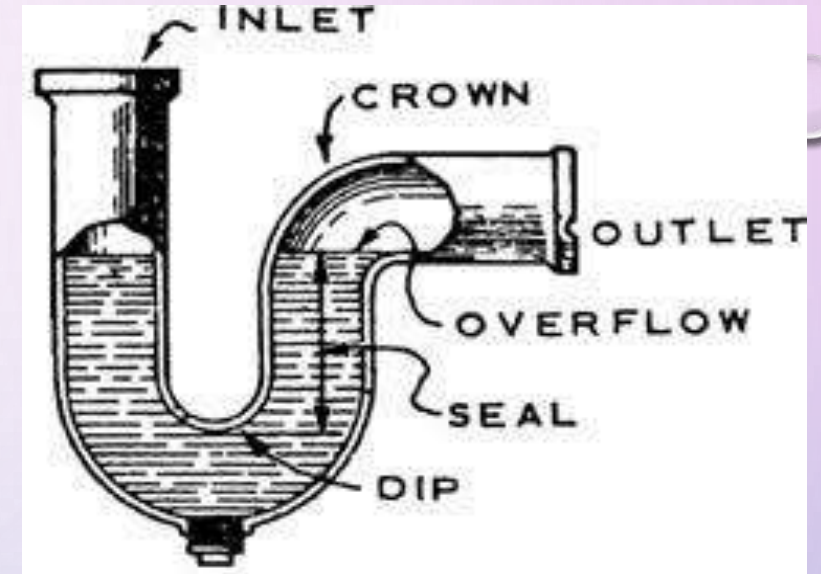
Q-traps

This trap is used in toilet under water closet. It is almost similar to S trap and is used in upper storey other than ground floor.
This is a common SWR fitting used in combination with Pushfit & Solfit Pipes. It **prevents transmission of unfavourable odours from the washroom to the living area**. Can be connected to the shower area and WC if the branch line outlet is in the vertical position.
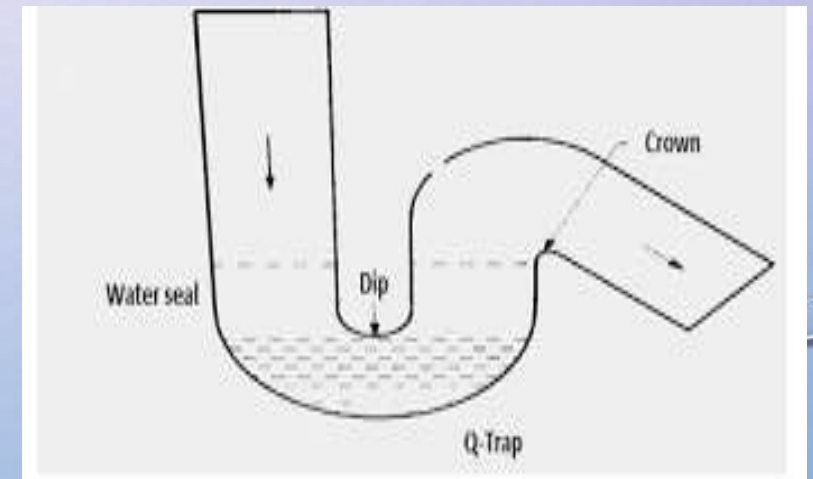
S-traps

S-traps are **a type of plumbing trap that blocks sewer gases in sinks and other plumbing fixtures**.
The S-shaped pipe configuration traps wastewater before it drains to the sewer line, creating a water seal that prevents gases from flowing up through the drain.

S Trap   P Trap
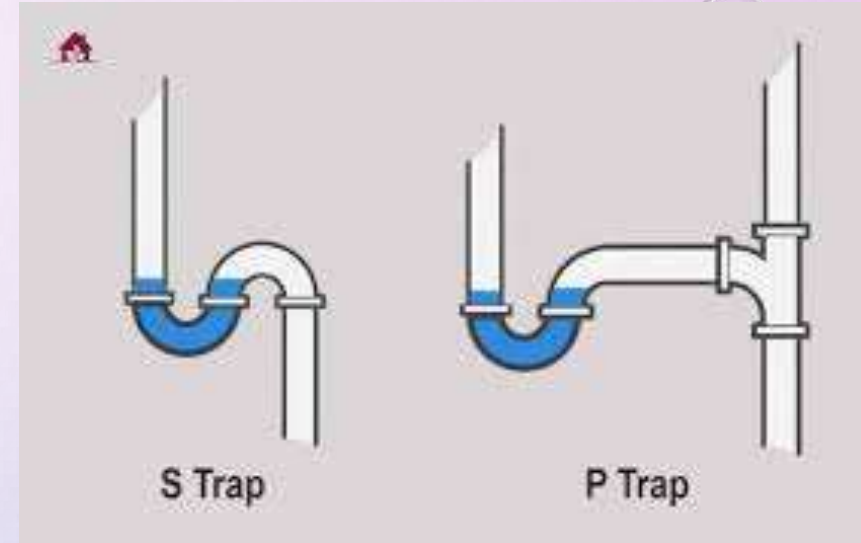
FLOOR TRAPS

•Floor trap or Nahni trap is provided in to the floor to collect waste water from bathroom, wash area, washbasin, and kitchen sink area etc.
• It is normally made in 80 mm diameter and the depth of water seal provided is about 50 mm.

Gully trap

A gully trap is provided outside the building before connecting it to external sewerage line. It also collects waste water from the kitchen sink, wash basins, bath and wash area.

A gully trap is **a basin in the ground which receives piped wastewater from inside your home before it is emptied into the wastewater network**. The basin has a water seal to prevent foul odours of the sewer reaching the surface, and a vent pipe that allows fresh air in.

Intercepting trap

Intercepting trap is provided in to the Interceptor Manhole (Interceptor Chamber). An Interceptor manhole is provided at the interception of building sewer and Public sewer. Intercepting trap is provided to prevent the foul gases from public sewers entering in to the building sewer by providing water seal.


Intercepting Traps
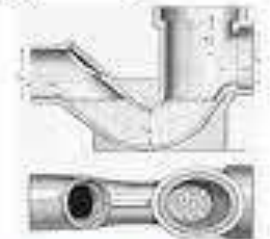
Grease Trap

Grease trap is installed in the waste pipe from one or more fixtures for the purpose of separating grease from the liquid and retaining the grease.

A grease trap is any interceptor, arrestor, tank, or pit situated above or under the ground that **allows cooling and separation of grease from used water**. Fat, oil, and grease discharged from food establishments are major causes of blockages in the public sewerage system.
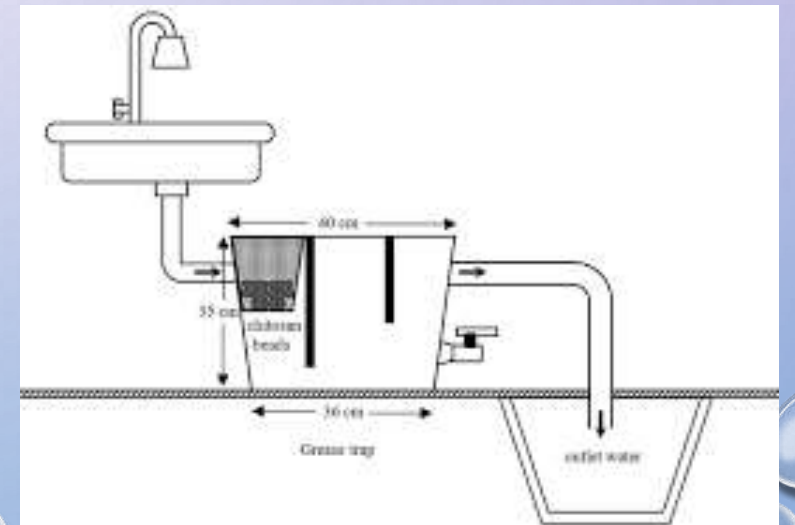
PRINCIPLE OF EFFICIENT DRAINAGE SYSTEM

1. House sewers or drains should be laid as far as possible at the side of the building rather than below the building.

2. The size of the drain should be sufficient so that they can avoid flooding of the drains during maximum discharge. Therefore, the size of the drain should be designed in such a way that they can easily handle the maximum discharge from the house.

3. The drain should be laid at sufficient gradient in order to establish self-cleansing velocity in them. The self-cleansing velocity helps to keep the sewer clean.

4. As far as possible, drains should be laid in straight lines between successive inspection chambers.

5. As far as possible, sharp bends and junctions should be avoided except through chambers or **manholes**.

6. Drains should be constructed on a good foundation and protect against external load.

7. Drains should be non-absorbent type.

8. The drain should be laid at such level that the lowest level of the building may drain in it.

9. All **sewer joints** should be made watertight and checked correctly before the drainage line is put into service.

10. The house drain should avoid a direct connection to the public sewers. The house drain should be connected to the public sewer if the level of the house drain is higher than the level of the public sewer.

11. Enough number of **trap** should be provided.

12. Proper ventilation should be provided to the entire drainage system.