

# MANHOLE AND SEWAGE DISPOSAL

## What is Manhole

Manholes are masonry or RCC chambers constructed at suitable intervals along the sewer lines for providing access into them.

## Purposes of Manhole

1. They are used to carry out inspection, cleaning and removing obstruction in the sewer line.
2. Manhole allows joining of sewers or changing the direction of sewer or alignment of sewer or both.
3. They allow the escape of considerable gases through perforated cover and thus help in ventilation of sewage.
4. They facilitate the laying of sewer line in convenient lengths.

## Location of Manhole

1. Manhole is provided when
2. There is change in grade of sewer
3. There is change in alignment
4. There is change in size of sewer
5. At junction of two or more sewers
6. Manhole is also provided in straight alignment of sewers at regular intervals depending upon the diameters of sewers. It ranges from 90m to 150m (300' - 500') e.g. 75m for 60cm $\phi$ , 120m for 90cm $\phi$  and 150m for 120cm $\phi$ .

## Types of Manhole

Depending upon the depth the manhole can be classified as;

### 1. Shallow manhole

It is provided at shallow depth of 75-90cm (2'-3'). It is provided at the beginning of branch sewer or at a place not subjected to heavy traffic. It is provided with a light cover at its top it is also called inspection chamber.

### 2. Normal Manhole

It is provided in sewer line at depth of 150cm with a heavy cover on its top. It is generally of square shape (or rectangular shape).

### 3. Deep Manhole

They are provided at depth greater than 150cm with heavy cover at the top. The size is gradually increased and a facility for going down is provided.

# Sewerage System and Sewage Disposal

It is the system and infrastructure of collecting, treating and disposal of sewage. There are three types of sewerage systems.

1. Separate System
2. Partially Separated System
3. Combined System

## 1. Separate Sewerage System

In this system the sanitary sewage and storm water are carried separately in two sets of sewers. The sewage is conveyed to waste water treatment plant (WWTP) and the storm water is discharged into rivers without treatment. The separated system is suitable when separate outlet for storm water is available and the topography is such that storm water can be disposed of in natural drains.

### Advantages of Separate System

- The load on treatment plant is less as only sewage is carried to the plant.
- The size of sewer is small, thus economical
- When pumping is required, the system proves to be economical.
- Natural/storm water is not unnecessarily polluted by sewage.

### Disadvantages of Separate System

- Cleaning of sewer is difficult due to their small size.
- The self-cleansing velocity is not easily obtained.
- The storm sewers come in operation in rainy season only. They may be choked in dry season by garbage.
- Maintenance cost is high
- Sewage sewers are provided below storm sewer which causes greater depth and pumping at waste water treatment plant (WWTP).

## 2. Partially Separate Sewerage System

This system is the compromise between separate and combine system taking the advantages of both systems. In this system the sewage and storm water of buildings are carried by one set of sewers while the storm water from roads, streets, pavements etc are carried by other system of sewers usually open drains.

### Advantages of Partially Separate Sewerage System

- It combines the good features of both systems.
- The silting is avoided due to entry of storm water.
- The storm water from houses is easily disposed off.
- The sewers are of reasonable size.

### Disadvantages of Partially Separate Sewerage System

A very small fraction of bad features of combined system are there in partially separated system.

### 3. Combined Sewerage System

In this system the sewage and storm water are carried combine in only one set of sewers to the waste water treatment. Plant (WWTP) before disposal.

#### Advantages of Combined Sewerage System

- Easy cleaning because of larger diameter
- Reasonable maintenance cost
- Strength of sewage is reduced due to dilution of sewage by storm water
- This system requires only one set of sewer making it economical

#### Disadvantages of Combined Sewerage System

- In storm season sewer may overflow and the sewer may damage causing serious health risks
- The combine sewer gets silted and becomes foul in dry days
- Load on treatment plant is more because storm water is also carried there
- The storm water gets polluted unnecessarily
- The system becomes uneconomical when pumping is needed

Source : <http://www.nprcet.org/e%20content/Misc/e-Learning/CIVIL/VI%20SEMESTER/10111CE605%20-%20Environmental%20Engineering%20II.pdf>