SEWAGE TREATMENT AND DISPOSAL

COLLECTION AND CONVEYANCE OF SEWAGE

Zerihun Alemayehu
**Sources of Sewage**

- Residential and commercial sewage
- Industrial wastewater, Segregation and pretreatment
- Unpolluted cooling water
- Strom runoff
- Infiltration and inflow
- Municipal wastewater treatment plant
- Combined sanitary and storm sewage
- Storm sewer
- Overflow bypass
- River
Sewerage systems

- **House sewer** - conveying an individual structure to a common sewer or other point of disposal.
- **Lateral sewer** - a common sewer collects flow from house sewers.
- **Submain sewer** - collects sewage from one or more laterals as well as house sewers.
- **Main or trunk sewer** - collects flow from several sub-mains as well as laterals and house sewers.
- **Force mains** - pressurized sewer lines, which convey sewage from a pumping station to another main or to a point of treatment or disposal.
- **Interceptor sewer** - separates dry weather flow and conveys it to a wastewater treatment plant
- **Relief sewer** - built to carry a portion of the flow in a system with inadequate capacity.
- **Outfall sewer** - carries the collected waste to a point of treatment or disposal.
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Sewage Treatment and Disposal

Zerihun A.
**System of Sewerage**

- There are three systems of sewerage
  - Separate system
  - Combined system
  - Partially combined or separate system
Separate System of Sewerage

• Advantages
  • The size of sewers are small
  • Sewage load on treatment units is small
  • River or stream waters are not polluted
  • Storm water can be discharged into streams or rivers without any treatment
  • Economical for sewage pumping since the quantity is small

• Disadvantages
  • Small sewer easily get choked and are difficult to clean
  • Laying two sets of sewer is costly
  • Storm water sewers are only used during rainy season
Combined System of Sewerage

• Advantages
  • Large sewer size don't clog easily and are easy to clean
  • Laying one set of sewer is economical
  • The strength of sewage is reduced by dilution
  • Maintenance cost is reasonable

• Disadvantages
  • Large sewers are difficult for handling and transport
  • Due to storm water load the treatment plant is high
  • During heavy rains sewers may overflow causing nuisance
  • Pumping is uneconomical
  • Storm water is unnecessarily polluted
Partially Combined sewerage system

• Advantages
  • Small sewers sizes are required
  • Has the advantages of both systems
  • Silting problem is eliminated
  • The problem of disposing off storm water from homes is eliminated

• Disadvantages
  • The velocity of flow may be low during dry weather
  • The storm water increases the load on pumps and treatment units
**Conditions to use separate system**

- In flat areas
- If sufficient fund is not available currently
- If annual precipitations very small
- Nearness of a natural river or drain
- If pumping is a must
- If existing sewerage system can be used only for sanitary sewage
- In rocky areas
CONDITIONS TO USE COMBINED SYSTEM

• If sufficient annual rainfall is present
• If pumping is required for both
• If space is limited
• If diversion of excess flow can be provided
• If existing system can carry both sewages
Collection pattern

- Collection pattern depends on
  - Area to be drained
  - The topography and hydrological features of the area
  - The sewerage system adopted
  - The location and methods of treatment and disposal works

- Common collection patterns
  - Radial pattern
  - Perpendicular pattern
  - Interceptor pattern
  - Fan pattern
  - Zonal pattern
**Radial Pattern**

- Irrigation field
- Irrigation field
- Treatment works
- River
**Perpendicular Pattern**

Lateral sewer

Main or trunk sewer

River
INTERCEPTOR PATTERN

INTERCEPTOR

OUT FALL SEWER