Shapes of Sewer & Patterns of Waste Collection

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Shapes of Sewers

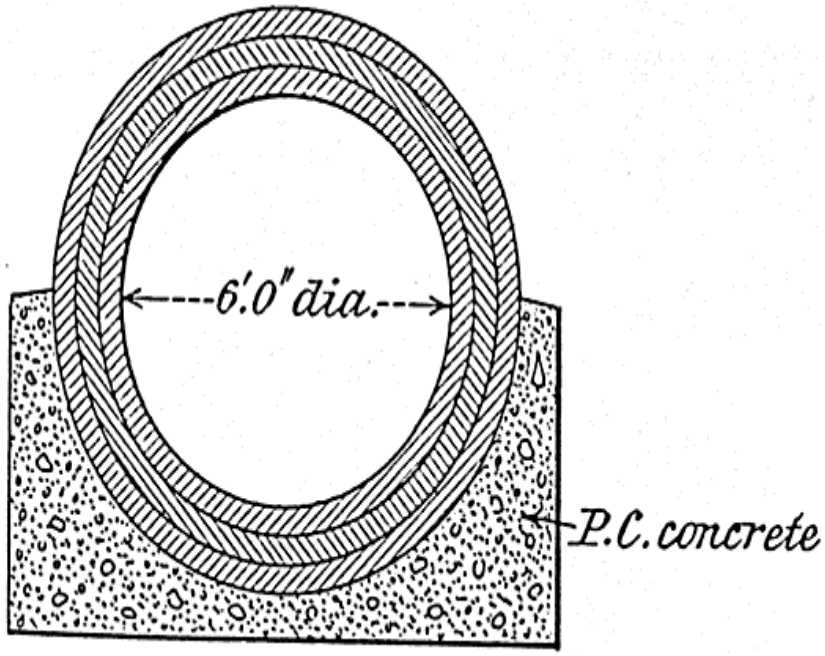
- Circular Shape
- Standard Egg Shape
- New Egg Shape
- Horse Shoe Shape
- Parabolic Shape
- Semi Elliptical Shape
- Rectangular Shape
- U- Shaped
- Semi Circular Shape
- Basket Handle Shape

Shapes of Sewers

- Normally sewer pipes are circular in shapes.
- The other types of shapes are prepared under special necessity for a particular project.
- Some of them are outdated.

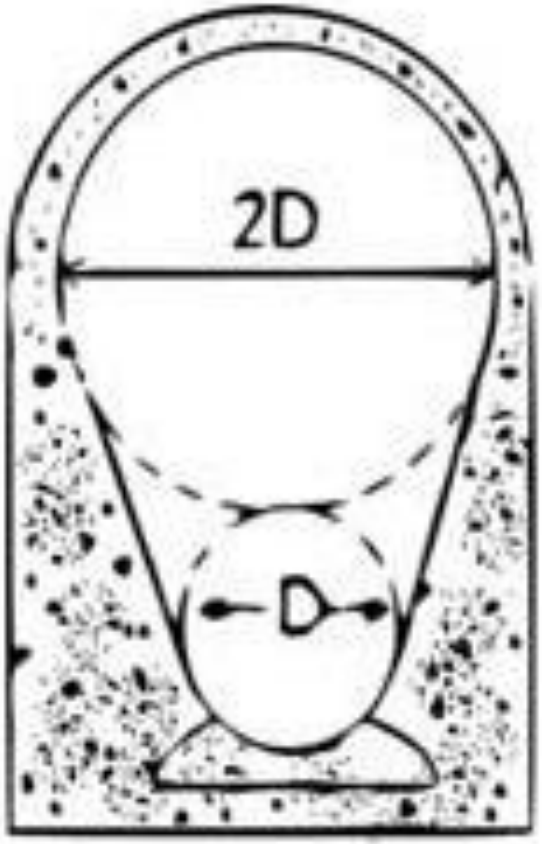
Circular Shape

- Most commonly used.
- It is preferred for all types of waste.



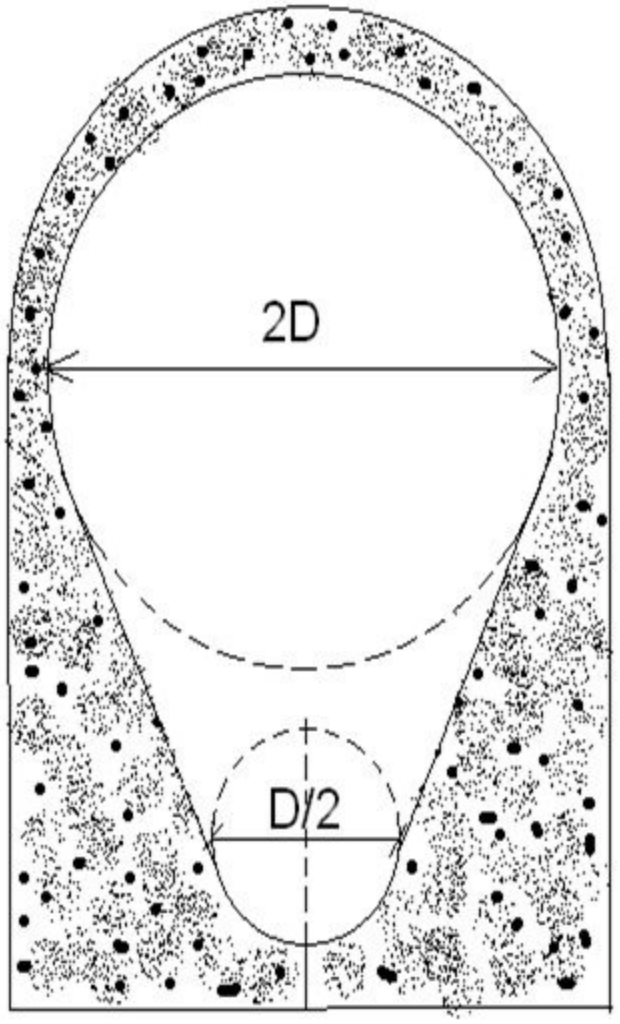
Standard Egg Shape

- It is preferred for combined sewers.
- Its advantage over circular shape is that it gives higher velocity during low flow of same capacity.
- It is difficult to construct and less stable.
- It requires additional bedding of brick masonry or concrete to make it stable.



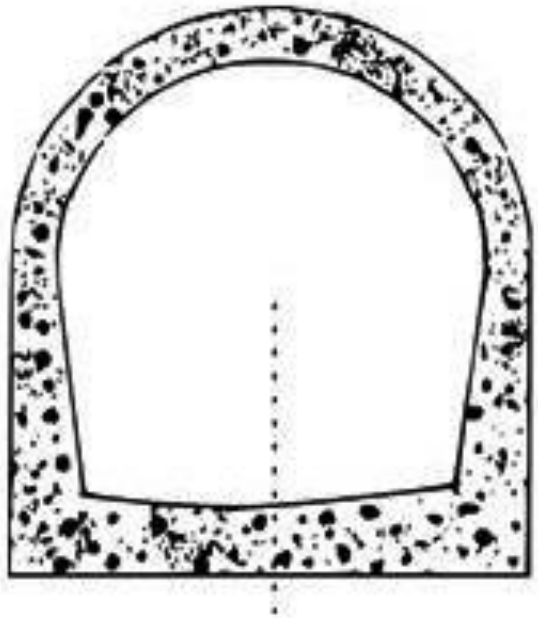
New Egg Shaped Sewer

- It may be preferred for combined sewer.



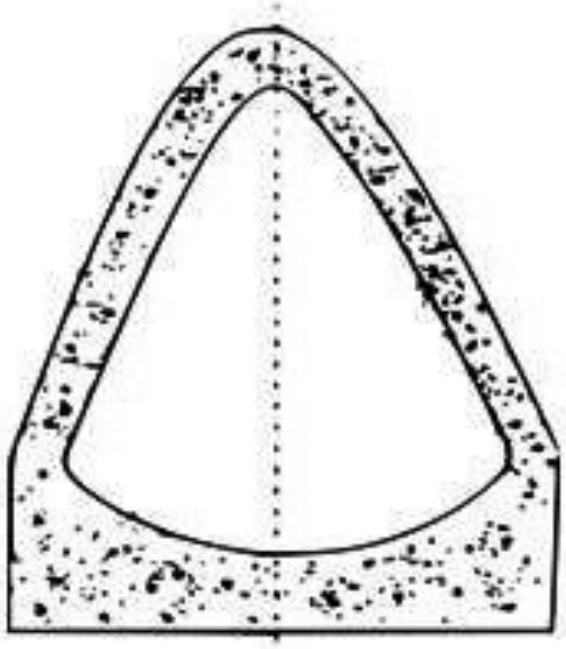
Horse Shoe Shaped Sewer

- This may be used for large sewers with heavy discharges such as for trunk and outfall sewer.
- Such sewer is suitable when headroom for the construction of sewer is limited.
- The invert of this section may be flat, parabolic or circular.
- Its height is more than its width.
- Its wall most inclined with semicircular arch at top.



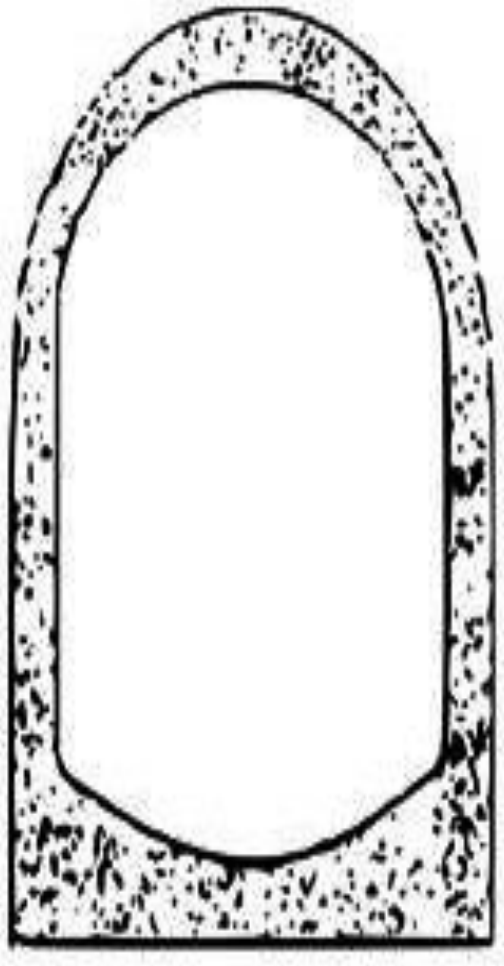
Parabolic Shaped Sewer

- The upper arch of the sewer forms the shape of parabola.
- This may be used for carrying comparatively small quantities of sewage.
- The invert may be elliptical or parabolic.
- It is found to be economic in construction.



Semi Elliptical Shaped Sewer

- It may be used for soil i.e. soft soil as it is more stable.
- It is useful only for carrying large number or amounts of sewage.
- It is adopted when sewers are greater than 1.8m in diameter or so.

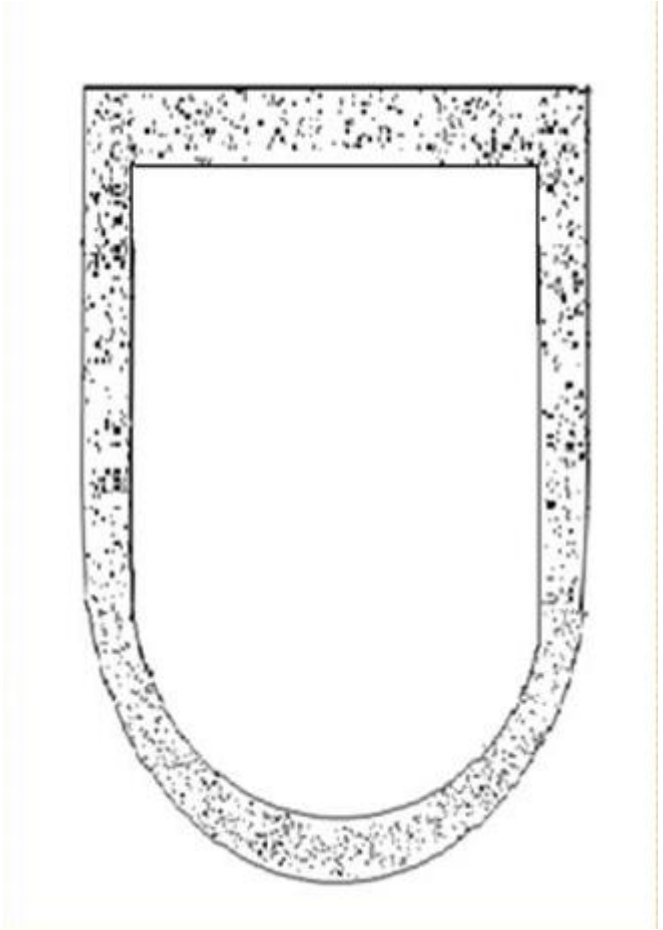


Rectangular Shaped Sewer

- Generally it is used for covered storm water drains.
- It is stable and easy to construct.
- Sometimes it is used to work as a storage tank.

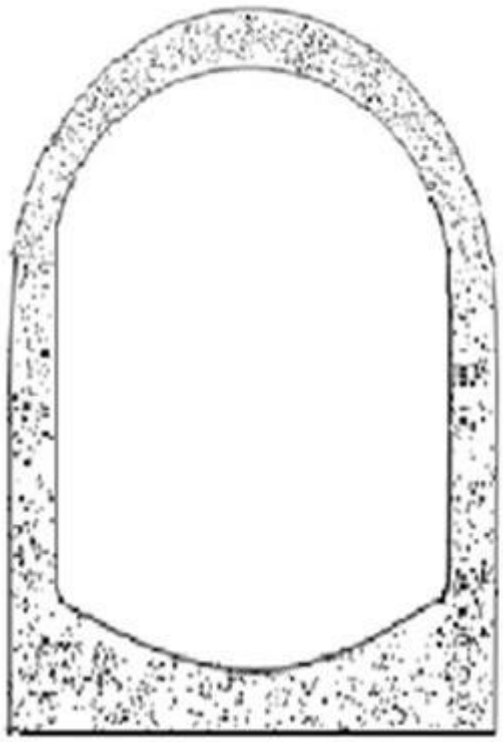
U Shaped Sewer

- The section may have true shape of letter ‘U’, or a small trench of U-Shape can be set up in the large section.
- That trench is known as cunette.
- Such type of sewer used for combined sewer having maximum flow of storm water.
- It is used for longer sewers and especially in open cuts.
- The invert is form in the form of semicircular arch.



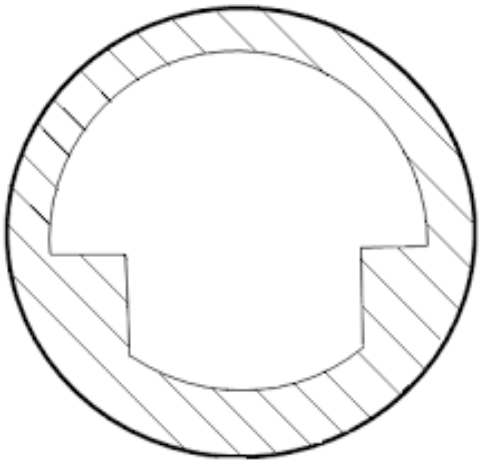
Semi Circular Shaped Sewer

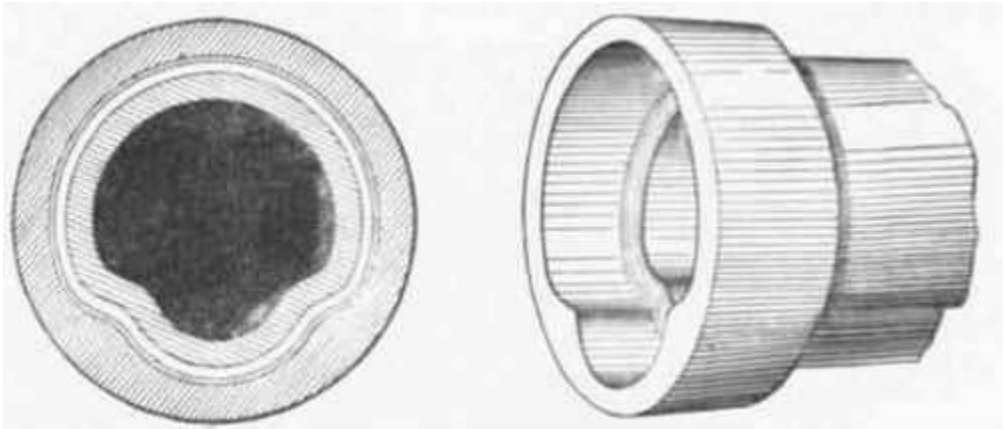
- This section gives a wider base at bottom and hence it becomes suitable for constructing large sewers with less available headroom.
- It is out dated.



Basket Handle Shaped Sewer

- In this type of sewer, the upper portion of sewer has got the shape of a basket-handle.
- The bottom portion is narrower in width than the upper portion.
- It carries small discharge through the bottom narrow portion and during monsoon it runs full.
- It is also out dated.





PATTERNS OF SEWAGE COLLECTION SYSTEM

Sewage Collection Patterns

- The network of sewers consists of house sewers discharging the sewage to laterals.
- The lateral discharges the sewage into branch sewers or sub-mains and sub-mains discharge it into main sewer or trunk sewer.
- The trunk sewer carries sewage to the common point where adequate treatment is given to the sewage and then it is discharged.

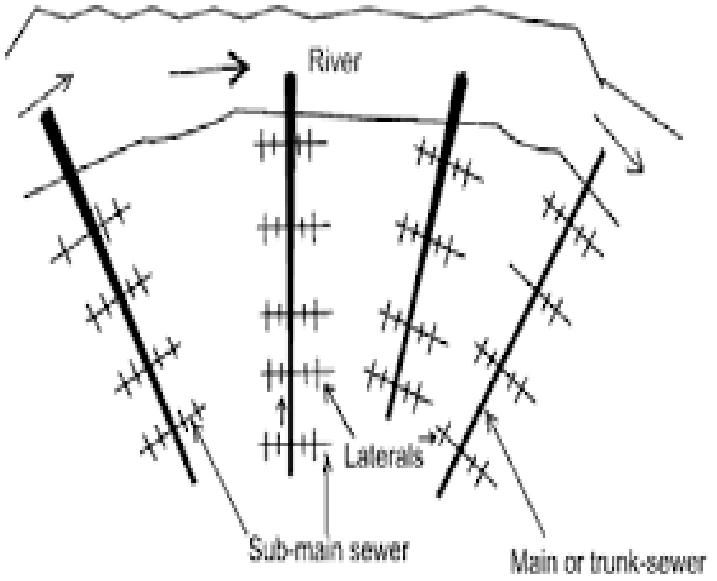
Contd….

The patterns of collection system depend upon:

- 1. The topographical and hydrological features of the area.
- 2. The location and methods of treatment and disposal works.
- 3. The type of sewerage system employed, and
- 4. Extent of area to be served.

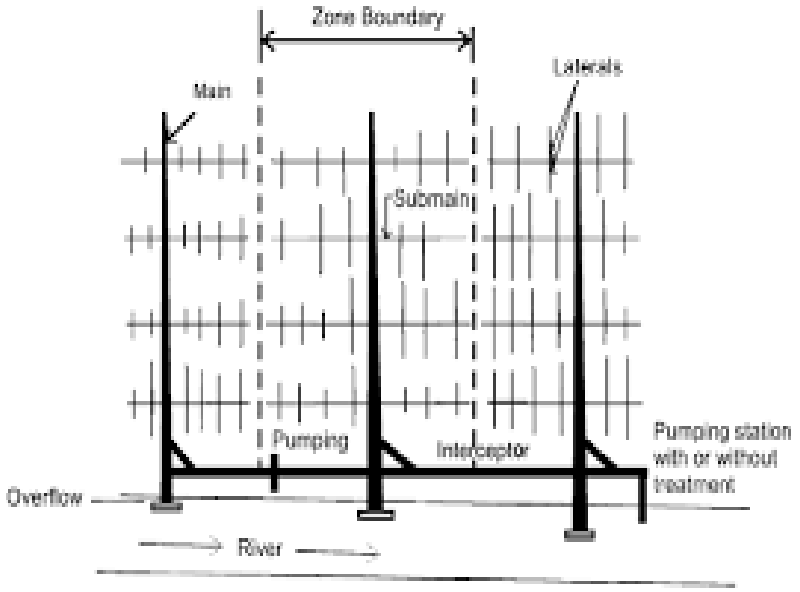
Perpendicular pattern

- The shortest possible path is maintained for the rains carrying storm water and sewage.
- It is suitable for separate system and partially separate system for storm water drains.
- This pattern is not suitable for combined system, because treatment plant is required to be installed at many places;
- Otherwise it will pollute the water body where the sewage is discharged.



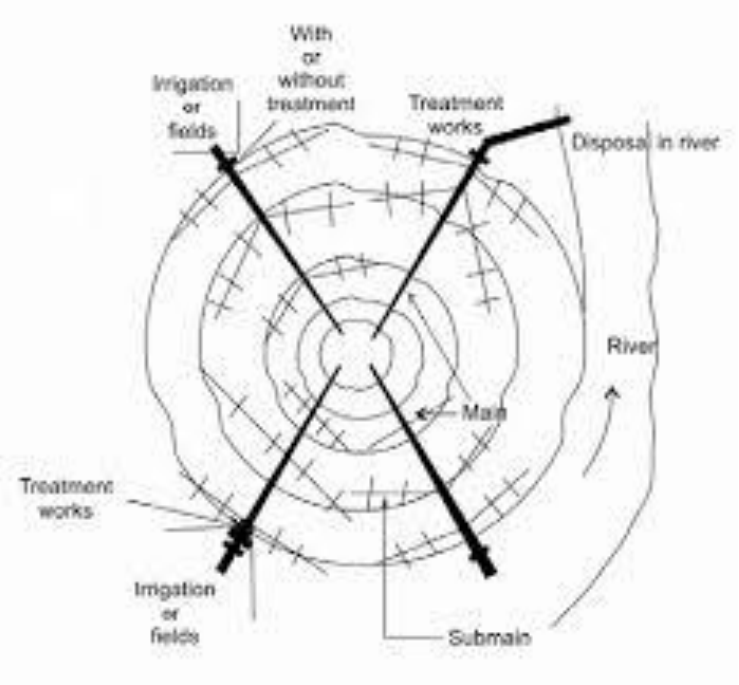
Interceptor pattern

- Sewers are intercepted with large size sewers.
- Interceptor carries sewage to a common point, where it can be disposed off with or without treatment.
- Overflows should be provided to handle very large flow.



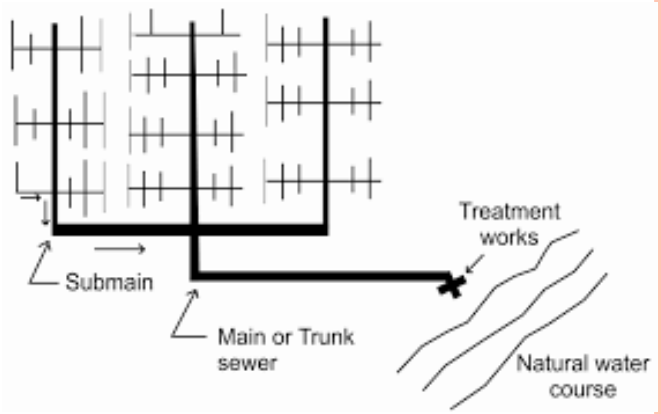
Radial Pattern

- It is suitable for land disposal.
- In this pattern sewers are laid radialy outwards from the centre, hence this pattern is called as radial pattern.
- The drawback in this pattern is more number of disposal works are required.



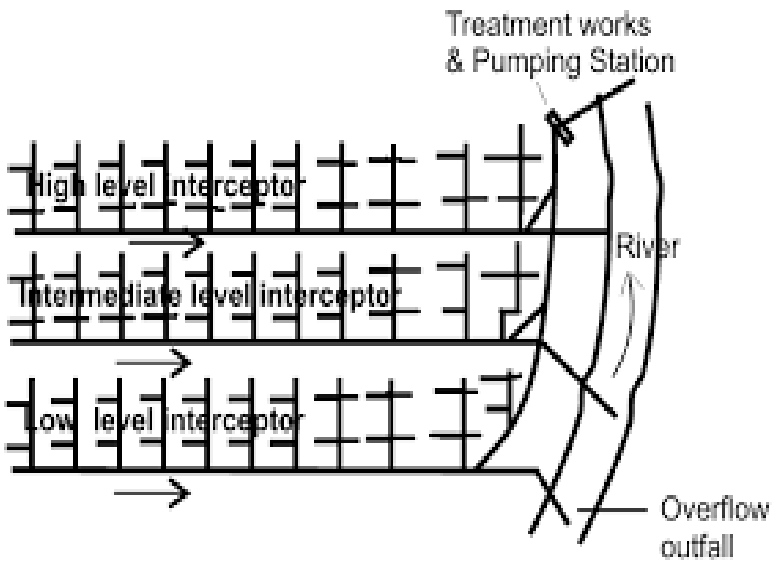
Fan Pattern

- This pattern is suitable for a city situated at one side of the natural water body, such as river.
- The entire sewage flows to a common point where one treatment plant is located.
- In this number of converging main sewers and sub-mains are used forming a fan shape.
- Single treatment plant is required in this pattern.
- The drawback in this pattern is that larger diameter sewer is required near to the treatment plant as entire sewage is collected at a common point.
- In addition, with new development of the city the load on existing treatment plant increases.



Zone Pattern

- More numbers of interceptors are provided in this pattern.
- This pattern is suitable for sloping area than flat areas.



Questions

- 1. Describe in brief various types of water carriage systems.
- 2. Describe merits and drawback of separate system, partially separate system and combined system.
- 3. What are the considerations while finalizing the type of sewerage system?
- 4. Write about various patterns of collection system.

References

- Garg S. K. - Waste Water Engineering
- Punmia B. C. - Waste Water Engineering
- Images – Google Images.

THANK YOU