

# DESIGN OF SEWER PIPELINE OF GULMOHAR RESIDENCY SECTOR-35 FARIDABAD

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**ABSTRACT** – Gulmohar Residency is located in the sector 35 of Faridabad Haryana. It is the first sector when one comes from New Delhi. Due to the close vicinity from New Delhi this area is rapidly growing and in fact it is the eighth fastest growing city in the world and third fastest growing city in India. Due to rapid urbanization and population growth the Water demand and sewage generation has been increased. The target goal of this research is to design an efficient sewerage system. To fulfil this aim proper survey, proper population projection, and proper design with all the key constraints has been performed. Sewer Pipeline design presented in this paper is a result of Sewer Modelling Software i.e. Bentley Sewer Gems Connect Edition. The Sewer Gems application provides reports, layouts, longitudinal or transversal cross sections of the pipe network, displayed in an advanced graphic system based on AutoCAD technology. With specific tools and features included, SewerGEMS Connect Edition gives full range of possibilities for the designer to draw, label, analyse, dimension, optimise and plotting the drawings of the sewage networks.



Fig -1 Google Earth View of Gulmohar Residency

**Key Words:** Peak Factor, Water Demand, Design period, Population Projection, Slope, Diameter.

## 1. INTRODUCTION

The Total area chosen for the present project Gulmohar Residency is 06 acres and 2.43 Hectares. Here the type of living style is plots system. Currently there are 68 Plots. In each plot there are 03 flats. Therefore the total flats are 204 in Nos.

The present population is approximately 1020. There is Cement Concrete Road inside the colony and its condition is also very good. Gulmohar residency comprises of 100% residential structures. There are 03 Parks and ample greenery with many huge trees are present in the society. The scope and objective of the present project was to design an efficient sewerage system for catering to the present population and also the future estimated growth.

## 2. METHODOLOGY AND DESIGN CRITERIA

In this project the adopted methodology consists of survey of houses of the projected area for data collection. Then using this data and Residents Welfare Association data, the population Projection of the area is performed by the standard method i.e. Arithmetic Progression Method. The Mid year and Ultimate year are taken as 2036 and 2051 which forms the basis of the current project. The water demand is 135 lpcd, sewage generation shall be 80 percent of water demand i.e. 108 lpcd. The Peak factor of 3 is taken as the population is 1020 nos.

Design Steps and Constraints are as follows:-

• Design Period – 30 Years
• Water Demand – 135 LPCD
• Sewage Generation – 108 LPCD
• Infiltration – 500 L/day/manhole
• Peak Factor – 03
• Pipe Cover – 0.9 m to 5 m
• Slope – As per CPHEEO,
• 1/250 – 200 mm dia,
• 1/360 – 250 mm dia.
• Manning’s Coefficient – 0.010
• Velocity (m/s) – 0.6 to 3m/s
• Material of Construction of Pipe DWC – Double wall Corrugated Pipe.

The Manning's formula is used for the design of sewers under gravity flow.

$$V = \frac{1}{n} \times R^{2/3} \times S^{1/2}$$

Where,

- V = Velocity in m/s
- N = Manning's Roughness Coefficient
- S = Slope or Hydraulic Gradient
- R = Hydraulic Radius in m
- Q = Flow rate in m<sup>3</sup>/s
- A = Cross Sectional Area of pipe in Sq. Meters

### 3. RESULTS

1. Depth of Sewer Pipe – Ranging from 1.12m to 2.1m
2. Designed Pipe Dia – 200 mm, 250 mm
3. Designed Population – 1680
4. Outfall - Septic Tank
5. Outfall Invert Level – 201.44 m
6. Outfall Ground Level – 203.00 m
7. Designed Flow – 563320 L/D
8. Manhole – Circular Shape
9. Total Manholes – 40
10. Total Pipe Length – 1010 m

Fig -3 Conduit Table in Software

### 4. CONCLUSIONS

Design of Sewer Network on Sewer Gems is efficient as the model has various options. Once all the design constraints are set in the software as mentioned in the table the sewer gems software automatically designs all parts of the Gravity Sewer Network.

With the help of Bentley Sewer Gems software the Hydraulic Design and drawing of Gulmohar Residency Sewer Network was completed within the short span of time and meeting all the technical specifications.

The biggest advantage of using sewer gems software is that it is easy and simple for the design of sewerage networks. Sewer Gems Software is helpful in designing small and large both sanitary sewer network.

A Drawing containing pipe details, Manhole details, velocity, elevations and flow can be directly obtained from SewerGEMS software. SewerGEMS Connect edition shall maintain the minimum and maximum velocity condition either by initial design constraint or by optimising with pipe slopes.

Fig -2 Manhole Table in Software

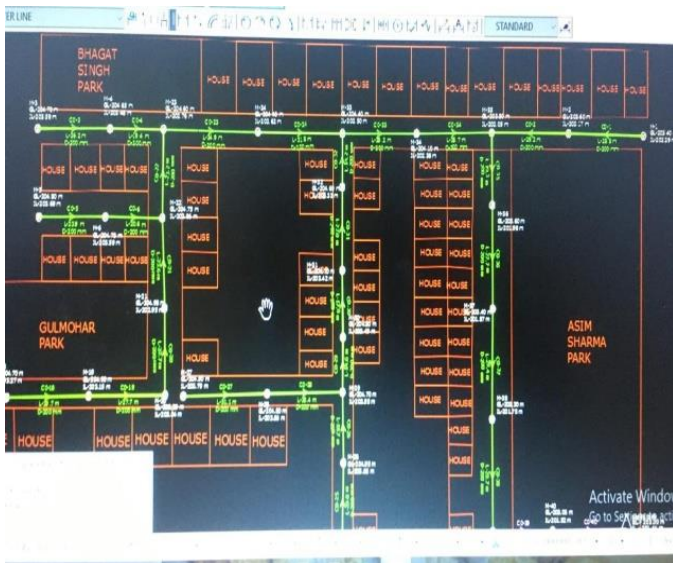


Fig 4: Sewer Layout

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