

Para 1.5. Population Forecast

1.5.1 General Considerations

The design population will have to be estimated with due regard to all the factors governing the future growth and development of the project area in the industrial, commercial, educational, social and administration spheres. Special factors causing sudden immigration or influx of population should also be foreseen to the extent possible.

A judgment based on these factors would help in selecting the most suitable method of deriving the probable trend of the population growth in the areas of the project from out of the following mathematical methods. Graphically interpreted where necessary.

a. Demographic Method of Population Projection

Population change can occur only in three ways.

- i. By births (population gain)
- ii. By death (population loss)
- iii. Migration (population loss or gain depending on whether movement out or movement in occurs in excess)

Annexation of an area may be considered as a special form of migration. Population forecasts are frequently obtained by preparing and summing up of separate but related projections of natural increases and or net migration and is expressed as below.

The net effect of births and deaths on population is termed natural increase (natural decrease, if death exceeds births).

Migration also affects the number of births and deaths in an area and so, projections of net migration are prepared before projections for natural increase.

Table 1.1 Design Period for Components of Sewerage System and Sewage Treatment

Sl.No.	Components	Recommended Design Period in Years	Clarification
1	Collection System .ie Sewer Network	30	The system should be designed for the prospective population of 30 years, as its replacement is not possible during its use
2	Pumping Stations (Civil Works)	30	Duplicating machinery within the pumping station would be easier/cost of civil works will be economical for full design period
3	Pumping Machinery	15	Life of pumping machinery is generally 15 years
4	Sewage Treatment Plant	30	The construction may be in phased manner as initially the flow may not reach the designed levels, and it will be uneconomical to build the full capacity plant initially.
5	Effluent Disposal and Utilisation	30	Provision of design capacities in the initial stages itself is economical

This method thus takes into account the prevailing and anticipated birth rates and death rates of the region or city for the period under consideration. An estimate is also made of the immigration from and immigration to the community. Its growth area wise and the net increase of population is calculated accordingly considering all these factors by arithmetical balancing.

b. Arithmetical Increase Method

This method is generally applicable to large and old cities. In this method the average increase of population per decade is calculated from the past records and added to the present population to find out population in the next decade. This method gives a low value and is suitable for well settled and established communities.

c. Incremental Increase Method

In this method the increment in arithmetical increase is determined from the past decades and the average of that increment is added to the average increase. This method increases the figures obtained by the arithmetical increase method.

d. Geometrical Increase Method

In this method percentage increase is assumed to be the rate of growth and the average of the percentage increase is used to find out future increment in population. This method gives much higher value and is mostly applicable for growing towns and cities having vast scope for expansion.

e. Decreasing Rate of Growth

In this method it is assumed that rate of percentage increase decreases and the average decrease in the rate of growth is calculated. Then the percentage increase is modified by deducting the decrease in rate of growth. This method is applicable only in such cases where the rate of growth of population shows a downward trend.

f. Graphical Method

In this approach there are two methods. In one, only the city in question is considered and in the second, other similar cities are also taken into account.

i. Graphical method based on single city

In this method the population curve of the city (i.e. the population vs past decades) is smoothly extended for getting future value. This extension has to be done carefully and it requires vast experience and good judgement. The line of best fit may be obtained by the method of least squares.

ii Graphical method based on cities with similar growth pattern

In this method the city in question is compared with other cities which have already undergone the same phases of development which the city in question is likely to undergo and based on this comparison, a graph between population and decades is plotted and extrapolated.

g. Logistic Method

The S shaped logistic curve for any city gives complete trend of growth of the city right from beginning to saturation limit of population of the city. This method is applicable for very large cities with sufficient demographic data.

h. Method of Density

In this approach the trend in rate of density increase of population for each sector of a city, is found out and population forecast is done for each sector based on the above approach. Addition of sector wise population gives the population of