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DESIGN OF CIRCULAR OVER HEAD TANK FOR VILLAGE SAKRAPAR, DEORIA U.P. INDIA

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ABSTRACT

Water demand is one of the key issues in water supply planning. To overcome this issue, the present water tank designs have to be modified. Overhead water tank is the most effective storing facility used for domestic or even industrial purpose. The design and construction methods in reinforced concrete are influenced by the prevailing construction practices, the physical property of the material and the climatic conditions, linings, the ground conditions i.e. type of soil, soil bearing capacity etc. The construction of overhead tank was done at the Sakrapar (Deoria). The ground water source use for the water supply of study location .Before the design and construction of overhead tank, analyses the physic-chemical and biological parameters of water quality. The ground water quality of study area are within the permissible limit as per IS 10500:2012. This paper gives an overall designing procedure of an Overhead Circular Tank using LIMIT STATE METHOD from IS-3370:2009.

Key words- Overhead tank, ground water, Physical-Chemical, Water supply

I.INTRODUCTION

A water tank is container for storing water and any other liquid. The main objectives in any design of water tank are to provide safe drinkable water after storing for long time, optimizing cost, strength, service life and performance during special situations like earthquakes. The other objectives are to maintain pH of water and to prevent the growth of microorganism. Water is susceptible to a number of ambient negative influences, including bacteria, viruses, algae, changes in pH, and accumulation of minerals, accumulated gas. A design of water tank or container should do no harm to the water.

One of the most important needs of any community development is a safe and adequate supply of potable water. Unfortunately, there is still a shortage of clean water supply in rural regions of many developing countries. A large proportion of the rural population in such countries, rely on the availability of man-made wells, natural springs and rivers, and recently on limited piped water supply schemes. The majority of such sources are nots at economical distances from the dwellings.

II.NEED OF WATER SUPPLY

Human life, as with all animal and plant life on the planet, is dependent upon water. Not only do we need water to grow our food, generate our power and run our industries, but we need it as a basic part of our daily lives - our bodies need to ingest water every day to continue functioning. "Basic needs of about 70litres per person per day". It includes the need for water to maintain a basic standard of personal and domestic hygiene sufficient to maintain health. The effects of inadequate water supply causes disease, time and energy expended in daily collection, high unit costs, etc. provision of basic daily water needs is yet to be regarded by many countries as a human right.

III.LITERATURE REVIEW

Neha. S. Vanjari, krutika. M. Sawant (2017) was design the over head tank of capacity 1000 m^3 for 6000 population and consider M30 concrete mix design and HYSD steel reinforcement. They were calculate the all necessary technical points in their research.

Nibedita sahoo (2008) was study about the design of water tank. She was analyses and mention each and every necessary point about design and construction of over head tank like cylindrical wall, upper and lower rim, joints etc.

Gurudatta ajay avinashe, Ranjan s. sonparote (2015) was analyses and design the overhead tank by use of vb.net for design of rcc overhead water tank. They were constructed the programme for give the constructional output of necessary detail of the over head tank.

IV.STUDY AREA

The study area is village Sakrapar district Deoria (U.P.) which is situated at Eastern part of Deoria and sakrapar spread into 169.1 Ha and which is at a distance of 3 km from Deoria. There are exist about 400 houses and it is lies between Latitude 26.4829° N and Longitude 83.8075° E.

V.SOURCE OF WATER

The various sources of water can be classified into two categories:

Surface sources, such as

1. Ponds and lakes
2. Streams and rivers
3. Storage reservoirs and
4. Oceans, generally not used for water supplies, at present.

Sub-surface sources or underground sources, such as

1. Springs;
2. Infiltration wells and
3. Wells and Tube-wells.

In this research ground water source use for water supply for Sakrapar because other water sources are unavailable in this area.

VI.GROUND WATER QUALITY OF STUDY LOCATION

A water quality investigation was carried out in the Deoria district, Ganga plain, to assess the suitability of surface and ground waters for domestic, agricultural, and industrial purposes. As much as 50 representative samples from river and groundwater were collected from various stations to monitor the water chemistry of various ions, comprising Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, HCO_3^{-}, SO_4^{2-}, NO_3^{-}, Cl^{-}, F^{-}, and trace metals, such as Fe, Cu, Mn, Zn, Cd, and Pb. The results showed that electrical conductance (EC), total dissolved solids (TDS), HCO_3^{-}, Mg^{2+}, Na^{+}, and total hardness (TH) are above the maximum desirable limit, and apart from Fe and Mn all other trace metals are within the maximum permissible limit for drinking water.

VII.TYPES OF TANK

Classification based on under three heads

1. Tanks resting on ground
2. Elevated tanks supported on stagging
3. Underground tanks.

Classification based on shapes

1. Circular tanks
2. Rectangular tanks
3. Spherical tanks
4. Intze tanks
5. Circular tanks with conical bottom

VIII.POPULATION FORCOSTING

A. Arithmetical Increase Method

This is the simplest method of population forecast, though it generally gives lower results. In this method the increase in population from decade to decade is assumed constant. Mathematically, this hypothesis may be expressed as

$Pn = P + nI$

Where Pn = future population at end of n decades

P = Present population

I = Average increment for a decade

B. Geometrical Increase Method

In this method, it is assumed that the percentage increase in population from decade to decade is constant. From the population data of previous three or four decades, the percentage increase in the population is found and its average is found. If Ig is the average percentage increase per decade, or rg is the increase per decade expressed as ratio, the population Pn after n decades is given by

Pn= P(1+Ig100)n=P(1+rg)n

Let P be the present population and P1 be the population after one decade.

Then,

$P1 = P$ +Ig100 = (1 +1100)1

Hence,

Pn= P(1+Ig100)n

This method gives higher result since the percent increase never remains constant but, instead decreases when the growth of the city reaches to saturation.

C. Incremental Increase Method

This method combines both the arithmetic average method and the geometrical average method. From the census data for the past several decades, the actual increase in each decade is found. Then increment in each decade is found. Population in next decade is found by adding to the present population the average increase plus the average incremental increase per decade. The process is repeated for the second future decade, and so on. And it is expressed as:

$Pn = P + nI + n\,(n + 1)/2$

Where, P = present population
I = average increase per decade
r = incremental increase
n = number of decades
Let P be the present population. The population P1 after one decade will be
$P1 = P + I + Ir$

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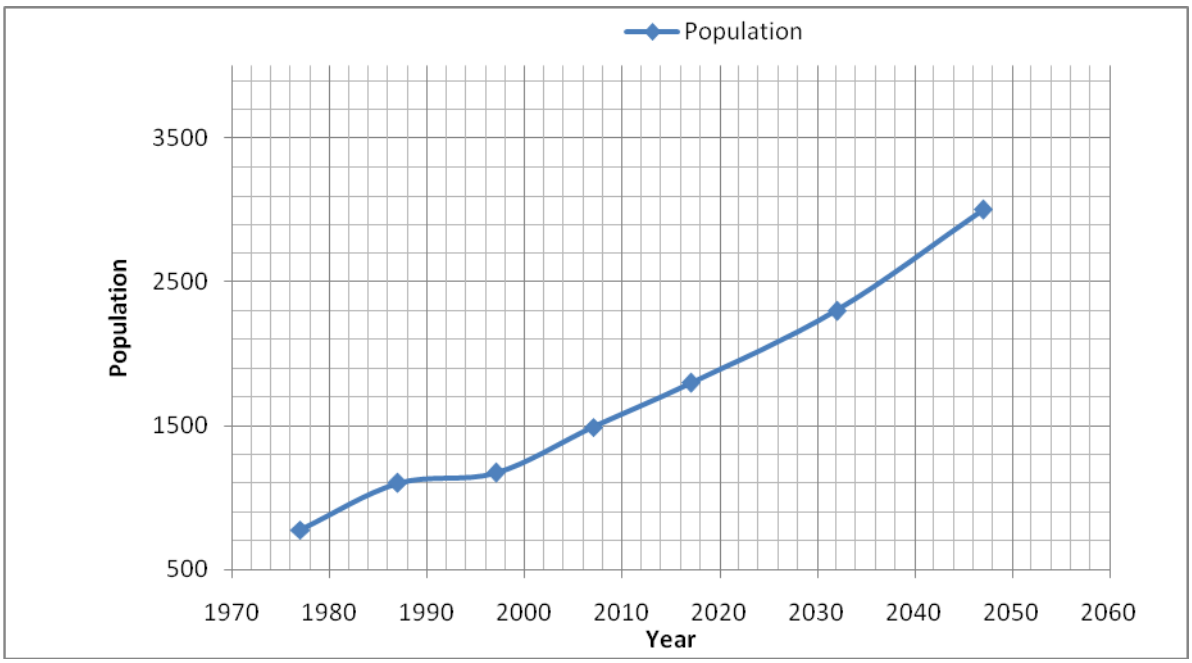
IX.DETAILS OF DESIGN

Table No.1

Year	Population	Increase per decade	Incremental Increase	Percentage Increase	Decrease in Percentage Increase
1977	775	…….	…….	…….	…….
1987	1103	328	…….	42.32	…….
1997	1175	72	-256	6.52	35.8
2007	1492	317	245	26.97	-20.45
2017	1800	308	-9	20.6	6.37
2032	2300	500	192	27.7	7.1
2047	3000	700	200	30.43	2.73
TOTAL AVERAGE		**2225 370.83**	**372 74.4**	**154.54 25.75**	**31.55 6.31**



X.DETAIL DESIGN OF CIRCULAR OVER HEAD TANK

Volume of tank = 242 kl

Capacity of tank = 242 m3

Height of tank = 4.5 m

Free board = 200 mm

Diameter of tank = 8.5 m

Hoop tension =180 KN

Area of steel = 1385mm2

Thickness of tank wall = 150 mm

Distribution reinforcement = 450mm2

XI.CONCLUSION

In this work, the water distribution system has been design with the which we use number of nodes, elevation, number of pipes and demands of Sakrapar area. First we surveyed the area and receive information about the population and per capita demand of the people. And according to that we design the distribution system for the area. In this system 2 centrifugal pumps are used having power of 10hp. In storage two overhead tanks are used having capacity of 242000 litres.

Here during the day time hours that is peak hours during morning time the demand of water is more as compared to the other time so the maximum supply is given for 8 hours a day.

The method of distribution used here is combined gravity and pumping system as firstly the water is pumped with the help of centrifugal pumps from underground water source i.e. from aquifers and then they are lifted up to the overhead water tanks and through there with the help of gravity system is transferred to the main rising pipe. The distribution layout used here is grid system which is according to the layout of the Sakrapar area.

REFERENCE

[1.] AsatiAnkush N., KaduMahendra S. (2014),"Seismic investigation of RC elevated water tank for
[2.] different types of staging patterns",4-7
[3.] Bhandari M, Singh Karan Deep (2014),"Comparative study of design of water tank", 231-238
[4.] Bhandari M, Singh Karan Deep (2014),"Economic design of water tank of different shapes"45-53
[5.] Durgesh, C. R. (2001) "Performance of Elevated Tanks in Mw 7.7 Bhuj Earthquake". Department of Civil Engineering, Indian Institute of Technology, India
[6.] Shirima L.M. (1996) "Reinforced Blockwork Water Storage Tanks- Reaching The Unreached: Challenges For The 21st Century", 22nd WEDC Conference, New Delhi