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'DESIGN AND ESTIMATION OF INTZE TANK'

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***ABSTRACT* –**Water storage tanks and overhead tanks used to store water. All tanks are designed as free structure to eliminate any leaks. Water tanks are important for public use and industrial building. The design and construction method of reinforced concrete are influenced by existing construction method, material properties, and climatic condition. Before undertaking this design, the designer must first determine the most appropriate type of tank measurement and the correct load rating including existing structural dimensions especially in relation to the overlap of prominent component will be made. The design should be based on the worst combination of loads, times and beards from vertical veins and horizontal load that work on either side when the tank is full and empty. In this study by performing an analysis of the Intze tank, what is the formation of deflection due to hydrostatic pressure and then pressure, etc. Revised. In this project a pressure mechanism is used to design INTZE Tank and the elements of the INTZE tank design for the state boundary approach.

***KEYWORDS*: Intze Tank, Design And Estimation, Civil Engineering, Property, Construction.**

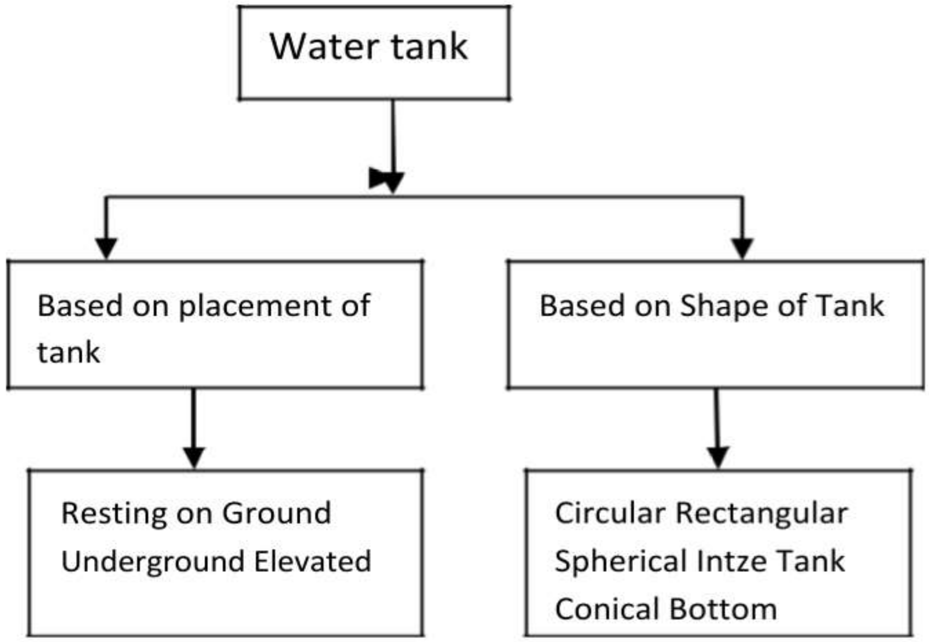
I. INTRODUCTION

Water is the lifeblood of all living thing on earth. Around the world, fluids are widely used by municipalities and industries for water availability, firefighting systems, flammable liquids and other chemical. Water tanks, therefore play a very important role in public consumption and the formation of industries that have the primary objective of protecting the constant supply of water from a long distance with a miraculously stationed head to desirable location under the force of gravity.

With the rapid increase in population, the demand for drinking water has increased by many limits. And due to power shortage in many parts of India and surrounding developing countries, it is not possible to pump water at a very high rate. In such cases rising water tanks becomes an important part of life. India is at high risk of natural disaster such as earthquakes, drafts, floods, hurricanes etc.

II. Classification of Water Tank

The classification of a reservoir is based on the location on which it is to be built and also on shape of reservoir.



III. SLOSHING EFFECT

The movement of liquid inside another object is known as Sloshing. The liquid sloshing may cause various engineering problems, for example instability of ships, in aerospace engineering and ocean engineering, failures on structural system of the liquid container. The motion of liquid with a free surface is of great concern in many engineering disciplines such as propellant slosh in spacecraft tanks and rockets (especially upper stages), cargo slosh in ship and trucks transporting liquid (for example oil and gasoline), oil oscillation in large storage tanks, water oscillation in a reservoir due to earthquake, sloshing of water in pressure-suppression pools of boiling water reactors and several others. Depending on the types of disturbance and container geometry, the free liquid surface can experience different types of motion including planar, non-planar, rotational, and symmetric, asymmetric, disintegration, quasi-periodic and chaotic When interacting with its elastic container or its support structures, the free liquid surface can exhibit fascinating types of motion in the form of energy exchange between interacting modes.

IV. WATER CONSUMPTION RATE

It is very difficult to precisely assess the quantity of water demanded by the public, since there are many variable factors affecting water consumption. the various types of water demand, which a city may have, may be broken into following class.

S. NO.	Types of Consumption	Normal Range (lit/capita/day)	Average	%
1	Domestic Consumption	65-300	160	35
2	Industrial And Commercial Demand	45-450	135	30
3	Public including Fire Demand Uses	20-90	45	10
4	Losses and Waste	45-150	62	25

Table -1: Water consumption for various purpose

The per capita fire demand is very less on an average basis but the rate at which the water is required is very large. The rate of fire demand is sometimes treated as a function of population and is worked out from following empirical formula.

Using National Board of fire Underwriter's formula,

P= when population is equal to less than or equal to 2,00,000

V. Fluctuations in Rate of Demand:

In Average Daily Per capita Demand = Quantity Required in 12Months/ (365 x Population)

If this average demand is supplied at all the times, it will not be sufficient to meet the fluctuations.

▪ **Seasonal variation:** The demand peaks during summer. Firebreak outs are generally more in summer, increasing demand. So, there is seasonal variation.

▪ **Daily variation** depends on the activity. People draw out more water on Sundays and Festival days, thus increasing demand on these days.

▪ **Hourly variations** are very important as they have a wide range. During active household working hours i.e., from six to ten in the morning and four to eight in the evening, the bulk of the daily requirement is taken.

. The effect of monthly variation influences the design of storage reservoirs and the hourly variations influences the design of pumps and service reservoirs. As the population decreases, the fluctuation rate increases.

Maximum daily demand = 1.8 x average daily demand Maximum hourly demand of maximum day i.e., Peak demand

= 1.5 x average hourly demand

=1.5 x Maximum daily demand/24

= 1.5 x (1.8 x average daily demand)/24

= 2.7 x average daily demand/24

= 2.7 x annual average hourly demand

VI. POPULATION FORECASTING METHODS

The various methods adopted for estimating future populations are given below. The particular method to be adopted for a particular case or for a particular city depends largely on the factors discussed in the methods, and the selection is left to the discretion and intelligence of the designer.

- Incremental Increase Method
- Ratio Method
- Logistic Curve Method
- Arithmetic Increase Method
- Geometric Increase Method.

VII. POPULATION CALCULATION

We can calculate the population of the selected site by using the Geometrical Increase method, the formula of this method is given by

Where P0 – initial population

Pn – future population after n decades

Number of houses = 338

Number of residents per house = 5* Total present population

= 338*5

=1690

Using Geometric Increase Method,

Future population= 2920.827

= 2921 (approx run-off)

VIII. PER CAPITA DEMAND

Calculation of water demand is done, as follows: -

Per capita demand = 135 lpcd

Water demand for future population = 135 l*2921

=394335 lpcd

= 394.355 m3

Losses (for theft, leakage etc) = 5 % of water demand

= 5 % of 394.33

= 19.71 m3

Fire demand (Using National Board of Fire Underwriter's formula) = [$4637\sqrt{P}(1-0.01\sqrt{P}$]

= [$4637\sqrt{2.921}(1-0.01\sqrt{2.921}$]

= 7.78m3

Coincidence Draft = Water demand + Losses + Fire demand

= 394.335 + 19.71 + 7.78

= 470 m3 (approx.)

IX. DESIGN OF TANK

Design of an intze tank for a capacity = 470 m3 = 4,70,000 liters Assuming height of tank floor above G.L = 12m

Wind pressure as per IS875 = 1200 N/m (Use M25 concrete and Fe 415 steel.)

σcbc = Permissible compressive stress = 25/3 = 8.33

σst = permissible stress in steel = 230 N/m3

m = modular ratio σcbc = $280/3\sigma cbc = 280/3*8.33$

k = 280/280+3σst = 280/280+3∗0.56∗415= 0.286

j = 1- **k/3**

= 0.904s.

S.No.	Permissible stress in tension		Permissible stress in shear
	Direct	Bending	
M20	1.2	1.7	1.7
M25	1.3	1.8	1.9
M30	1.5	2	2.2
M35	1.6	2.2	2.5
M40	1.7	2.4	3.7

Table - Permissible stress in concrete

X. CONCLUSION

In the upper dome all stress is within the permissible limits as in both drawing due to not considering the effect of an earthquakes on IS 3370-2009.Hoop in compatibility is not modified but valid steel measurement method is change as IS 3370- 2009. Therefore, the reinforcement area+21% increase. As a result of seismic pressure consideration, it increases by 45% and stabilization in middle ring beam is increased by 50% due to increased hoop friction and lowering the allowable metal pressure limit as in IS3370-2009. Meridional resilience increased by 51% due to the consideration of the effects of earthquakes. Also, of 250mm the minimum pressure density of the dome mermen increases by 1.81 N/mm2 which is more than the allowable concrete pressure limit of 1.5 B/mm2 due to the maximum load strength in each wing area. Reducing the combined pressure increases the size of lower dome 250mm to 320mm. Also, the allowable metal pressure limit of 130 N/mm2.

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