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OVERHEAD WATER TANK DESIGN AND COMPARISON BY MANUAL AND USING SOFTWARE (ETABS)

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ABSTRACT –

For all living things to survive, water is essential. In regions where water is scarce, water provision is crucial. The water in those locations is supplied by tanks of water. Water tanks of this kind are constructed in public. The people receive their water supply from the tank via pipelines. The shapes of these tanks vary, including round and rectangular shapes. It can be built at varying elevations.Elevated circular water tanks in this project are manually developed utilizing the limit state design approach with codes (IS 3370-2009(part I–IV), IS 456-2000), and software design is also completed with ETABS. Lastly, contrast the outcomes from the program and the manual methods. It is mentioned at the project's conclusion that there are some

Key Words: Elevated circular water tank, limit state method,ETABS.

INTRODUCTION :

General

The primary goals of water tank design are to maximize cost strength, service life, and performance in unique scenarios such as earthquakes, and to deliver safe drinking water after extended storage. The preservation of the water's pH and stopping the growth of microorganisms are the other goals. Numerous harmful environmental factors, such as bacteria, viruses, algae, pH changes, and the buildup of minerals and gas, can affect water. Water shouldn't be harmed by the design of water tanks or other containers.

The overall layout of the tank and the selection of the linings and building materials are among the criteria of water tanks.
IS code is the basis for the design of reinforced concrete water tanks. The layout of the tank determines whether it is subterranean, above ground, or both. Steel and RCC are also possible materials for tanks. A variety of columns and beams are typically used to raise the overhead tanks above ground level. The underground tanks, on the other hand, are buried below earth.

For every kind of species on the planet, water is essential to survival. Around the world, locations and organizations mostly employ liquid storing tanks for firefighting systems, water supply, flammable liquids, and unique chemicals. Water tanks thus accept a crucial component for.

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Objectives

The objectives of this study are listed below:

1. To compare, with reference to IS 3370 Part I–IV and IS 456–2000, the design of an elevated circular water tank completed manually and using ETABS software
2. To research the quantity of steel needed for the water tank.
3. To research how software design and manual design differ from one another.

4. To examine the various design stages of an elevated circular water tank utilizing the IS codes (IS 3370 Part I–IV, IS 456–2000) and the limit state design approach.

Scope of study

Information regarding the usage of corn cob ash as a pozzolana in the concrete mixture is provided in this study. The addition of corn cob ash to concrete improves its compressive strength. After 28 days, the initial compressive strength of the concrete made with corn cob ash was lower than that of ordinary concrete, but the strength gradually increased with time. In this project, we investigate the utilization of corn cob ash in concrete to create a high-quality composite material that will soon be used for reasonably priced building.

SOURCES OF WATER SUPPLY :

Two categories can be used to group the different water sources: external sources, like

1. Ponds and lakes;
2. Streams and rivers;
3. Storage reservoirs; and
4. At the moment, oceans are not typically utilized as water sources. underground or subterranean sources, like
5. Springs;
6. Infiltration wells ; and
7. Wells and Tube-wells.

Water Quantity Estimation

The following information is needed to determine the amount of water needed for municipal applications, for which the water supply scheme must be designed:
Water consumption rate (Per Capita Demand in litersper day per head) Population to be served.
Quantity= per demand x Population

Sr.no	Types of Consumption	NormalRange (lit/capita/day)	Average	%
1	Domestic Consumption	65-300	160	35
2	Industrial and Commercial Demand	45-450	135	30
3	Pu25blic including FireDemand Uses	20-90	45	10
4	Losses and Waste	45-150	62	25

Factors affecting per capita demand:

Size of the city: Per capita demand for big cities is generally large as compared to that for smaller towns as big cities have sewered houses.

Presence of industries.

Climatic conditions.

Habits of economic status.

Quality of water: If water is aesthetically $ peopleand their medically safe, the consumption will increase aspeople will not resort to private wells, etc.

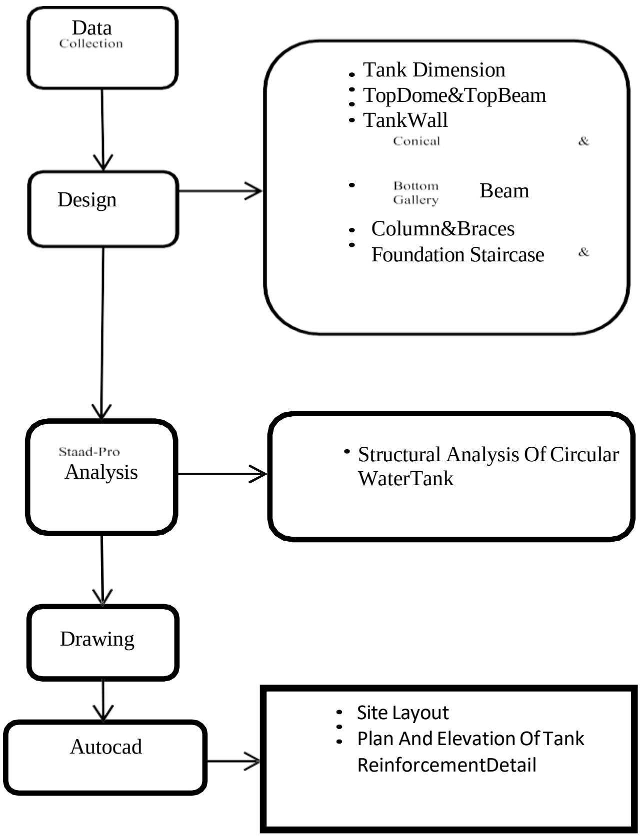
Pressure in the distribution system.

Efficiency of water works administration: Leaksin water mains and services; and un authorised use of water can be kept to a minimum by surveys.

Cost of water.

Policy of metering and charging method: Water tax is charged in two different ways: on the basis of meter reading and on the basis of certain fixed monthly rate.

Methodology



RESULTS

Results of manual

- Number of columns = 33
- Type of foundation = step footing
- Plinth beam = 0.25 x 0.35 m
- Brace size = 0.25 x0.35 m upto 3rd brace
- Floor slab beam 0.23 x 0.30
- Rcc wall (pardi) = thickness 0.25 up 3.00
- = 0.20 above 3.00
- Footing to plinth level of bottom = 3.00m
- Plinth Bottom to floor slab 20.00m
- Floor slab to roof slab= 5.30
- Staircase= 127 no
- Staircase= 127 no

B) COMPARISION

Design Data:
Key Levels:
Full Supply Level (F.S.L.) 125.52

Outlet Level (LW.L.) 120.02

C) Results by SOFTWARE method

Number of columns = 22 nos
Type of foundation = trapezoidal footingPlinth beam = 0.25 x 0.40 m
Brace size = 0.25 x0.40 m upto 3rd braceFloor slab beam = 0.23 x 1.050
Rcc wall (pardi) = thickness 0.25 up 3.00
= 0.20 above 3.00 Footing to plinth level of bottum = 3.00 mPlinth Bottom to floor slab 20.00m
Floor slab to roof slab= 6.15

RESULT AND DISCUSSION

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= 0.20 above 3.00	= 0.20 above 3.00
• Footing to plinth level of bottum = 3.00m	• Footing to plinth levelof bottum = 3.00 m
• Plinth Bottom to floor slab 20.00m	• Plinth Bottom to floorslab 20.00m

• Floor slab to roof slab= 5.30	• Floor slab to roof slab= 6.15
• Staircase= 127 no	
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CONCLUSIONS

- This research compares the elevated circular water tank design created using software and manual methods. to understand how much steel is needed for the water tank. Finally, conclusions about the study are drawn.
- The amount of steel required for the whole structure is lessfor software design compare to manual design.
- The total steel required from software design is 9334 mm2and manual design is 9948 mm2.
- While comparing with manual design software design saves 10% of steel in whole structure.
- Manual design method require more time and complicated. Whereas the design done in etabs software require less time.

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