

Design, Estimation and Costing of the Super structure of Circular Water Tanks Considering Different Loadings and Soil Conditions

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Abstract— Today, water consumption is more increasing day to day due to increase population, and distribution of water is difficult task. Elevated water tank constructed for storing water for better convey in huge area. The paper describes, water tank constructed in same regions having different soil condition and columns. The cost of water tank is evaluated on basis of the soil condition, columns and different size of water tank and taking account of seismic and wind effect on the water tank evolved using by working stress method.

Key words: Water Tank, Cost, Design, Soil, Quantity

I. INTRODUCTION

In the rapidly expanding world today there is ever-increasing need to preserve and store water. This will be either fresh water pumped from well or the purified water coming out from treatment facility. Whichever is the source, the water must be stored and available for the man or industry whenever needed. There is an extreme need for large, efficient and economical storage facilities. Water is the elixir of life. it should be constructed crack free and imperviousness of water. Classification of water tanks on basis of their structure with respect to ground, resting on ground, elevated and underground. Water tank constructed in different shapes circular, rectangular, intze, spherical and funnel.

Circular tanks with flat slab are used for heavy capacities. If the capacities are large then, flat slab may prove to be an economical alternative in such circumstances, because flat slab can withstand greater load by vertical action. Circular water tank with dome & base flat slab is used for all types of capacities due to its simplicity in geometry which gives economical result & better stability in seismic prone zone and wind zone.

II. OBJECTIVE

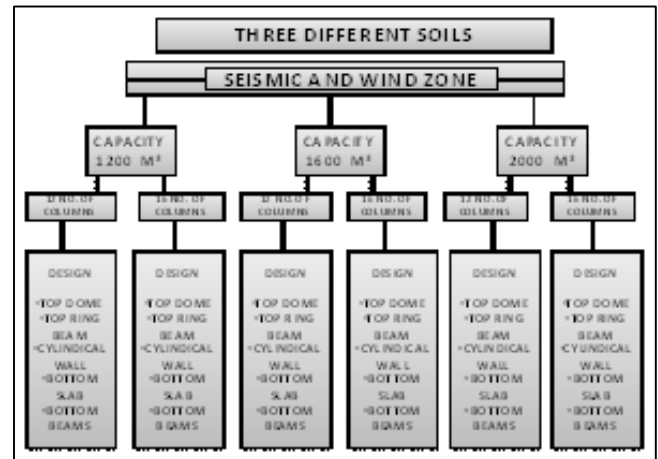
To analysis of effect on quantity in components of elevated circular water tank under seismic, wind loading, different soil conditions, columns and different size. Circular tank designed using ESR - GSR software according to guidelines IS Code 456: 2000, IS-3370-I, II, III, IV & IS 1343.

III. METHODOLOGY

The design of circular tank may be divided in the following steps;

- 1) Design of top dome.
- 2) Top ring beam.
- 3) Design of cylindrical wall.
- 4) Design of bottom slab.
- 5) Design of the ring beam and supporting beams.

IV. PROJECT AIM:



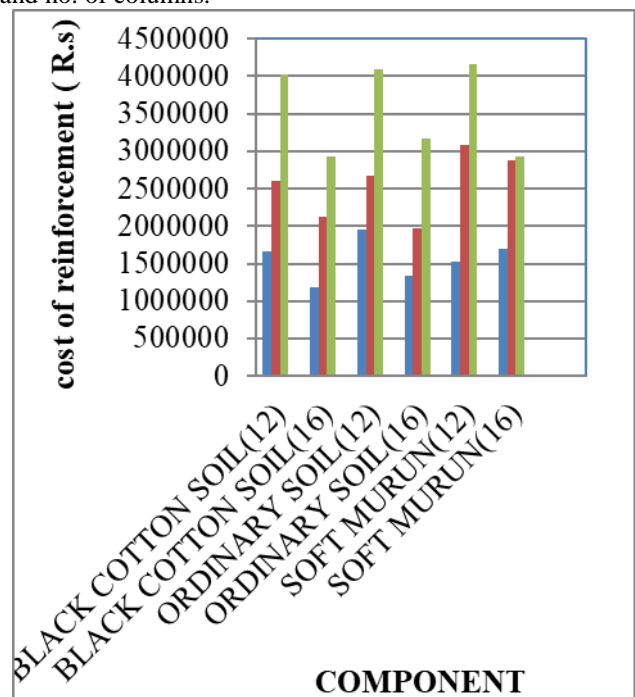
V. RESULTS & DISCUSSION:

A. Cost Analysis

Cost Analysis of reinforcement and concrete in circular water tank is determined for various seismic zone and wind zone under different soil conditions and capacities, no. of columns.

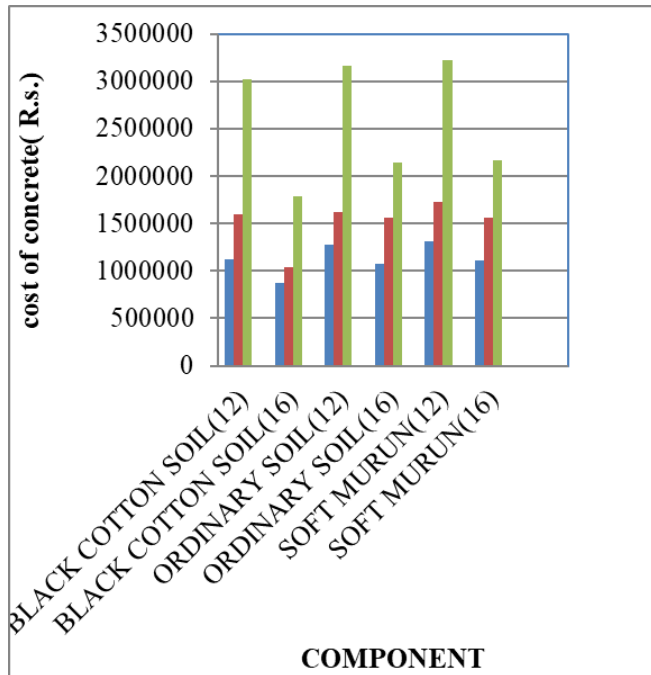
1) Reinforcement Cost:

The cost of reinforcement variation for different soil conditions in circular water tank for seismic zone, capacities and no. of columns.



2) *Concrete Cost:*

The cost of concrete in seismic zone for different soil condition in water tanks.

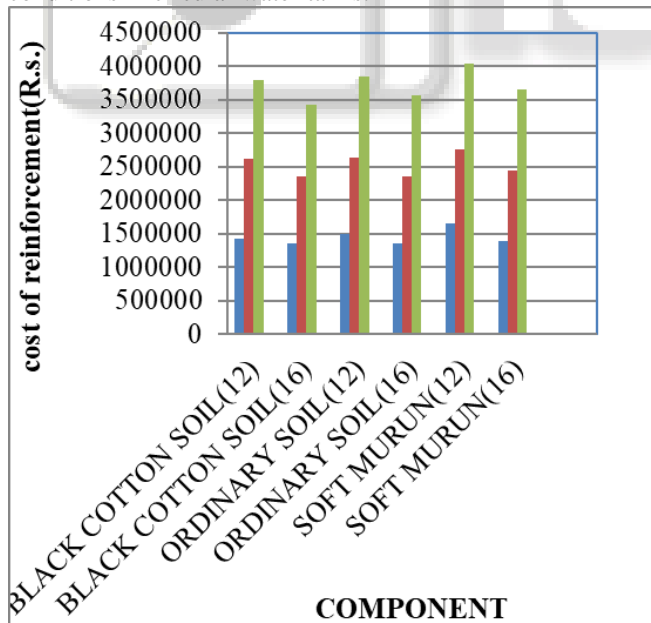


B. *Wind Effect*

Effect of wind analysis over cost of different materials used in water tanks structured with different types of soil conditions. Considering three types of soil conditions.

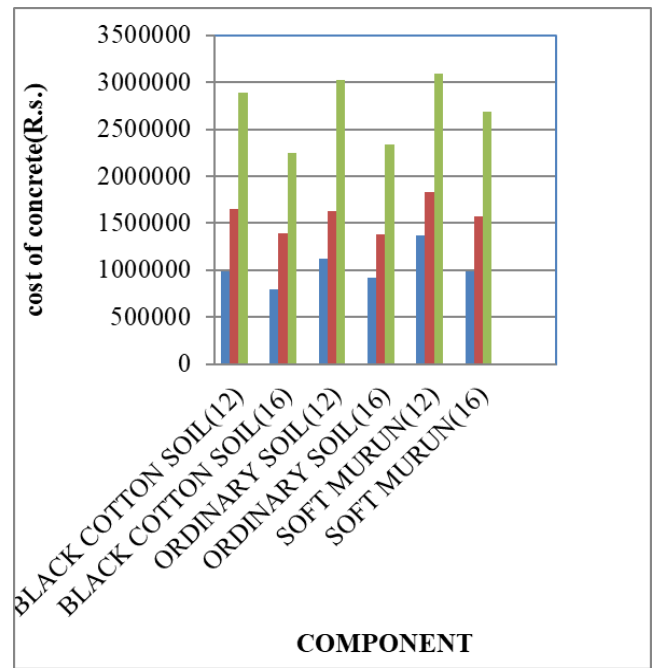
1) *Cost of Reinforcement:*

The cost of reinforcement in wind zones for different soil conditions in circular water tanks.



2) *Concrete Cost:*

The cost of concrete in wind zone for different soil conditions in circular water tanks.



VI. CONCLUSION

In this study the seismic and wind analysis of the circular water tanks. For all the above mentioned 1200m³, 1600 m³, 2000 m³ capacities, analysis has been carried out by using ESR-GSR software. Earthquake and wind analysis is carried out at different soil conditions and different capacities. The main objective of this project to study the effect of seismic and wind on reinforcement and concrete elevated circular water tank in different columns as 12 and 16 for black cotton, ordinary and soft murum soil conditions for different component of super structure of the circular water tank.

- 1) This result at different capacity of circular water tank in different columns base in seismic and wind zone. The quantity of concrete and reinforcement for super structure are given below.
- 2) In seismic zone the same capacity of tank quantity of concrete and quantity of steel both are decrease in 16 no. of columns as comparison 12 nos. of columns.
- 3) In wind zone the same capacity of tank quantity of concrete and quantity of steel both are decrease in 16 no. of columns as comparison 12 nos. of columns.
- 4) The result shows that the quantity of material is more for soft soil as compared to black cotton and ordinary soil.
- 5) The result shows that the amount of reinforcement and concrete increase in 2000 m³ capacity.
- 6) Maximum cost of concrete of water tanks is found under 12 no. of columns. The result shows that the amount of material increases 12 columns.
- 7) The result also shows that the influence of seismic effect is more than compared to wind effect on the different member of circular water tank.
- 8) The above given graph that the geometrical data of superstructure are same while the volume of concrete and quantity of steel in superstructure are varying with variation in the no. of columns, seismic zone and wind zone.
- 9) Development of general purpose software for design and cost estimation of circular water tank.

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