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ANALYSIS AND DESIGN OF ELEVATED SERVICE RESERVOIR

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***Abstract*—The water is the most essential elements to a life on the earth. It is a liquid which covers about 71.4% of the earth. The purpose of the study of the ELEVATED SERVICE RESERVOIR is to design and build safe and economical ESR, where in the damage to the structure and its structural components even by natural hazard such as earthquake can be minimized. In this particular project we are about to deal with the tank which designed as crack free structures to eliminate any leakage for this WORKING STRESS METHOD is used to design an INTZE tank for our COLLEGE CAMPUS. In this, we had to the Design of ELEVATED SERVICE RESERVOIR and Analysed using STAAD PRO.**

Keywords—Elevated Service Reservoir, Working Stress Method, Staad pro

I. INTRODUCTION

In India more than 68% of its total population lives in rural areas. Domestic water is a major problem in these areas, so as to solve this problem innovative design and strategies and solution to existing problem is essential, hence for that study of ESR is undertaking. For storage of large quantities of liquids like water, oil, petroleum, acid and sometime gases also, containers or tanks are required. Water tanks are very important components of lifeline.
A large number of overhead water tanks were damaged during the past earthquakes. Hence seismic behaviour of these structures during the earthquakes has to be investigated in detail in order to meet the safety objectives while containing construction and maintenance costs. So there is need to focus on seismic safety of lifeline structure using with respect to alternate supporting system which are safe during earthquake and also take more design forces. Shape of the water tank is an important design parameter because nature and intensity of stresses are based on the shape of the water tank. INTZE type water tank is one such water tank which has circular shape with a spherical top and conical slab with spherical dome at the bottom.

II. LITERATURE SURVEY

Mr. Manoj Nallanathel[1], Mr.B.Ramesh[2], L.Jagadeesh[3] (2018)- The shape of the tanks plays predominant role in the design of overhead and underground water tanks. Usage of Staad pro in design gives accurate results for shear force and bending moment than convenient method.

Shahid Arshad[1], Irfan Y.Khan[2] (2017) – The direct stresses and bending moment induced under peripheral and interior column are within the permissible limit for Zone-2 and Zone-3 and for Zone-4 interior column fail in bending so therefore there is a need to increase the size of column for safety in flexure.
The axial force, shear force and bending moment for interior columns comparatively more than peripheral columns for both the conditions i.e. Full and Empty.

[1]Neha. S. Vanjari, [2]Krutika. M. Savant,[3]Prashant. S. Sisodiya,[4]S. B. Patil (2017) –Elevated Water Tanks provide head for supply of water. When water has to be pumped into the distribution system at high heads without any pumps for supply however pumps are necessary for pumping only till tank is filled.

Bugatha Adilakshmi[1] , Paliki Suribabu[2], Reddi Ramesh[3](2016)-They concluded that from chart-1, cost will reduce when bearing capacity of soil increases.
From chart-2 they concluded that between 5 lakhs to 10 lakhs capacity there is no so much of cost variation, in this region cost not so much dependant upon soil bearing capacity.
From chart-3 they concluded that for 5 lakh litre capacity of water tank, for the wind speed between 33-41 m/s, Cost is approximately constant. But in the same region for 10 lakh to above capacity, cost will varies.

Dona Rose K J[1], Sreekumar M[2],Anumod A S[3] (2015) – The peak displacements from the time history analysis under EI centro earthquake records are below the maximum permissible displacement for different water levels. The peak displacement from the time history analysis increases with staging heights. But the displacement first decreases and then increases with capacities.

G.P. Deshmukh[1], Ankush. S. Patekhede[2] (2015) – In this project, emphasis is given on the study of the inbuilt feature of solving seismic coefficient method in STAAD PRO V8i. This method provides the values of time period and base shear, Which are very much in agreement with the values of the manually calculated results.

Manish N. Gandhi, Prof. A. Rajan(2014)-For basic staging overturning moment is highest as compared to the other staging patterns.
The slender staging that results from the low design forces is a very unfavourable feature for seismic areas for elevated water tanks.
The current design of RC shaft type circular staging for elevated water tanks are extremely vulnerable to lateral loads cause by earthquakes.

III. NEED AND SCOPE OF STUDY

The need of study is to meet the basic requirements of the people living in the Rural Areas. For this purpose the design of the INTZE Type ELEVATED SERVICE RESERVOIR has been done. The basic need of design of ELEVATED SERVICE RESERVOIR are to provide safe drinkable water after storing for long time. ELEVATED SERVICE RESERVOIR is essential to provide pressurized water at higher level. These amenities can be fulfilled with the help of government schemes.

Scope of this project is to overcome the problems of low water pressure at all distribution ends. By providing the ELEVATED SERVICE RESERVOIR various facilities of peoples can be improving so that the standard of living can be improved.

Requirements of ELEVATED SERVICE RESERVOIR

- Safe drinking water
- Storage of various liquids
- Supply pressurized water at higher level

Fig.1 INTZE TYPE ELEVATED SERVICE RESERVOIR

Fig.2 ELEVATED SERVICE RESERVOIR

Fig.3 ELEVATED SERVICE RESERVOIR IN PUBLIC HEALTH ENGINEERING DEPARTMENT

Amenities Available

- Drinking water facility

Clean drinking water is available in the village. It has two ESR having capacity 80000 litres and 50000 litres. Village gets the water by Burhan Nagar Water Scheme.

Fig.4 CIRCULAR TYPE ELEVATED SERVICE RESERVOIR

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