



SEISMIC BEHAVIOUR OF RCC WATER TANK RESTING ON GROUND WITH CHANGE IN GEOMETRY

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Abstract - Water tanks are very imperative for public convenience and for industrial structure. Water tanks are very significant components of lifeline. They are grave elements in municipal water supply, fire fighting systems and in many industrial amenities for storage of water. From the very upsetting experiences of few earthquakes in India, R.C.C elevated water tanks were profoundly damaged or collapsed.

This might be due to the lack of knowledge regarding the proper behavior of supporting system of the tank due to the dynamic effect, improper geometrical selection of staging, and also due to lack of earthquake resistant design.

The main aim of this study is to understand the significant of considering earthquake loads in design & the behavior of strengthening the conventional type of staging to give enhance during earthquake

Keywords- Rigid based water tank, RCC water tank, reinforce cement Concrete, design, details, minimum total cost, tank capacity

I. INTRODUCTION

Circular tank is the simplest of the various shapes, for the same capacity of storage, it has the advantage that it requires less material for construction than a rectangular tank on account of its circular shape it has no corners and can be made, water tight easily. Storage tanks are built for storing water, liquid petroleum, petroleum products and similar liquids. Analysis and design of such tanks are independent of chemical nature of product.

Rectangular tanks are normally provided when capacity of liquid to be stored is small for small capacities, circular tanks work out to be uneconomical on account of high cost curved shuttering. On the other hand, circular tanks by virtue of their having least perimeter for a given capacity, require least amount of materials and as such prove to be economical for large capacities of storage. However, in case circular tanks, it is difficult to divide the tank in compartments and they do not occupy the entire available area of land. Rectangular tanks do not have such disadvantages.

II. RELATED WORK

This chapter consist, how to use the various types of water tank, materials properties of materials, design philosophy, and software for the analysis of structures. The complete work was divided into three phase and each stage from respective phase was implemented. The research methodology consists of following points.

Phase 1:-

1. To study about the analysis of water tank.
2. To study the guidelines for the design of liquid retaining structure according to I.S. code.
3. To know about design philosophy for safe design of water tank subjected to seismic forces.

Phase 2:-

1. To consider a problem and do analysis and design of same manually.
2. To analysis and same structure using Staad-Pro software for normal and seismic force.
3. Different method of seismic analysis applied to the water tank.

Phase 3:-

1. To make observation on the basis of analysis result for the above cases.
2. Future scope.
3. References

III.SOFTWARE RESULT

Table 6.1. Displacement for circular tank with flexible

NODE NO.	LOCATION	MM	DISPLACEMENT	
			EQX	EQZ
99	TOP	0.117	0.000	0.000
87	TOP IN 1	0.330	0.000	0.000
75	TOP IN 2	0.605	0.000	0.000
63	TOP IN 3	0.924	0.000	0.000
51	TOP IN 4	1.148	0.000	0.000
39	TOP IN 5	0.863	0.000	0.000
27	TOP IN 6	0.000	0.000	0.000

Displacement for circular tank with fixed

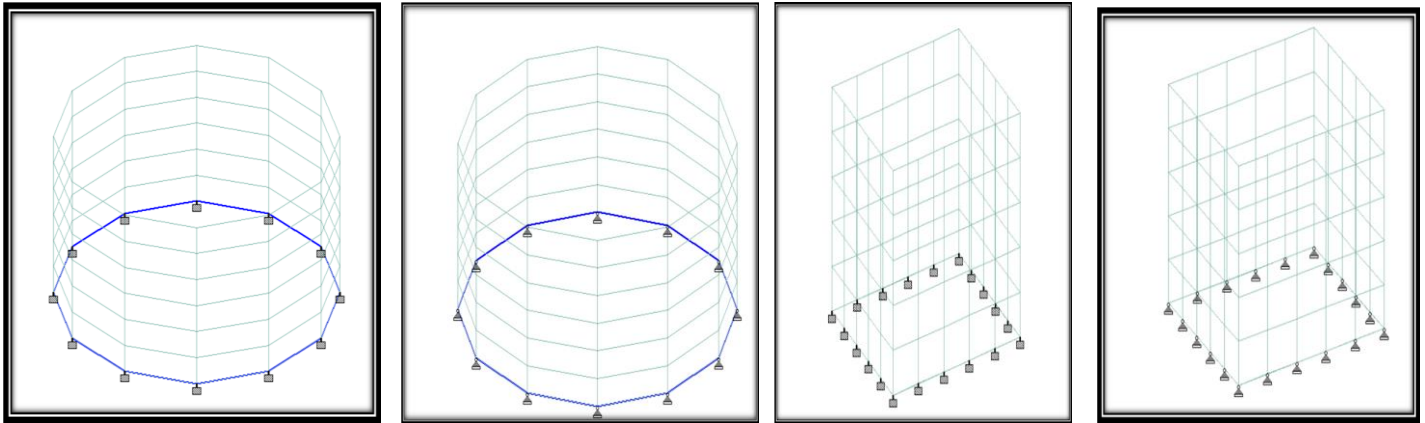
NODE NO.	LOCATION	MM	DISPLACEMENT	
			EQX	EQZ
99	TOP	0.145	0.000	0.000
87	TOP IN 1	0.339	0.000	-0.000
75	TOP IN 2	0.613	0.000	-0.000
63	TOP IN 3	0.925	0.000	-0.000
51	TOP IN 4	1.092	-0.000	-0.000
39	TOP IN 5	0.701	-0.001	-0.000
27	TOP IN 6	0.139	-0.001	-0.000

Displacement for rectangular tank with flexible

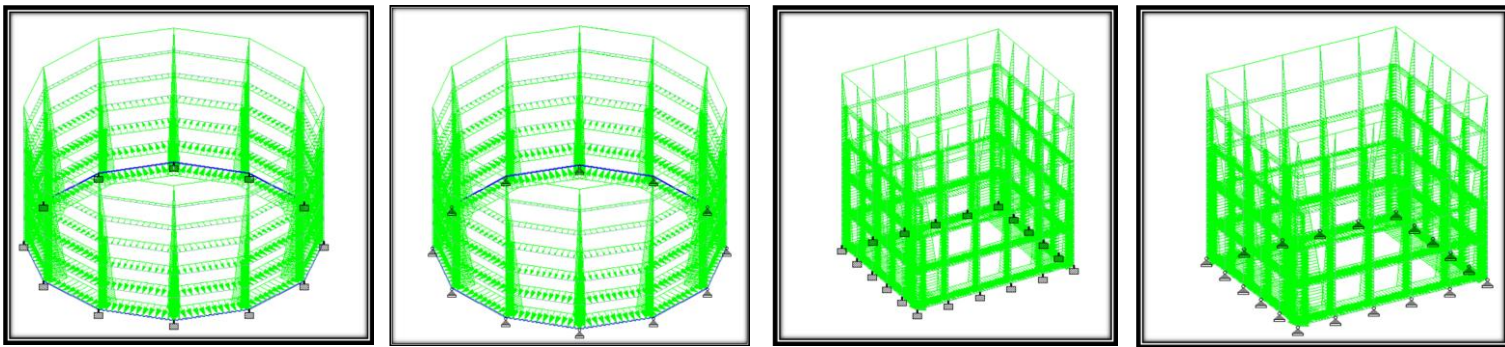
NODE NO.	LOCATION	MM	DISPLACEMENT	
			EQX	EQZ
75	TOP	1.206	0.000	-0.002
76	TOP IN 1	1.444	0.000	-0.002
81	TOP IN 2	1.708	0.000	-0.003
86	TOP IN 3	1.791	-0.000	-0.003
91	TOP IN 4	1.292	-0.001	-0.002
26	TOP IN 5	0.000	-0.001	-0.001

Displacement for rectangular tank with fixed

NODE NO.	LOCATION	MM	DISPLACEMENT	
			EQX	EQZ
73	TOP	2.225	0.000	-0.001
74	TOP IN 1	2.544	0.000	-0.001
80	TOP IN 2	2.876	0.000	-0.001
85	TOP IN 3	2.631	-0.001	-0.001
90	TOP IN 4	1.316	-0.002	-0.000
95	TOP IN 5	0.000	0.000	0.000



Water Tank with Different Supports



Water Tank with Dead Load

IV. CONCLUSION

Water tank is being one of the life structures at the time of nature hazards like earthquake, need, precise analysis and design.

Be normal forces acting on water tank are self weight hydrostatic pressure however at the time seismic forces the hydrodynamic forces are also induces however with change in geometry keeping the capacity and the height same the stability condition of water tank are change with these view the four water where analysis with circular and rectangular shape and different support condition from the seismic analysis of water tank it is observe that maximum displacement is for rectangular water tank with fixed support where is minimum for the tank is circular shape and hinged support.

Similarly shears force is almost absent with circular shape. The moment along the tank is more again for the rectangular shape when the support condition are fixed. The comparatively values of reaction show that more lateral reaction values are develop for circular water tank.

Thus from the above analysis and observation it can be concluded that the circular water tank shows lesser displacement, shear force, bending moment, as that compare to rectangular shape water tank for the same capacity same height and same material.

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