

## Effect of h/D Ratio in Seismic Analysis of R.C. Elevated Circular Water Tank

Chetan Jaiprakash Chitte<sup>1</sup>, Shrikant Charhate<sup>2</sup>, S. Sangita Mishra<sup>3</sup>

<sup>1,2,3</sup> Department of Civil Engineering, Amity School of Engineering and Technology, Amity University Maharashtra, Mumbai - Pune Expressway, Bhatan Post - Somathne, Panvel, Mumbai, Maharashtra 410206, India

<sup>1</sup>Research Scholar, <sup>2</sup>Professor, <sup>3</sup>Associate Professor  
chetanjchitte@gmail.com

### ABSTRACT

Elevated water tanks are considered a living structure and therefore, their earthquake safety is a matter of great concern. Water storage tanks shall function even after the earthquake for the access to drinking water in the earthquake-affected areas and to fulfill the need for fire fighting. To design a structure to remain elastic or undamaged is uneconomical and difficult to justify for an infrequent earthquake type loading. Instead, it is common design principle to accept some structural as well as non-structural damage during severe earthquake in a structure, provided it does not lead to collapse of structure. The present study focuses on seismic analysis of RC circular water tank for 200Cu.m capacity. Seismic analysis is performed in accordance with IS 1893 (Part-2):2014. The analysis of tank is carried out for four seismic zones (Zone-II, Zone-III, Zone-IV and Zone-V) with three types of soil conditions (Rocky or Hard Soil, Medium Stiff Soil and Soft Soil) as per Indian standard. Further three different h/D ratios with tank full condition, tank half-filled condition and tank empty condition are considered in this study. From the analysis, it is found that the tank design is governed by tank full condition. Values of design horizontal seismic coefficient in impulsive mode ( $A_{hi}$ ) are less than those for convective mode ( $A_{hc}$ ), for tank full condition. This is due to lower values of time period in impulsive mode. For the same soil condition, values of design horizontal seismic coefficient in impulsive mode ( $A_{hi}$ ) and convective mode ( $A_{hc}$ ) increases for higher seismic zone. The values of base shear and base moment are found to be governing in tank full condition as compared with tank half-filled and tank empty condition.

**Keywords:** *Elevated water tank, Seismic analysis, Base shear, Base moment, Impulsive and convective modes, seismic coefficient*