

## Chapter 3

### EXISTING STRUCTURES & MATHEMATICAL MODELING

#### 3.1 Existing Structures

Three numbers of existing water towers were selected for research work having capacities of 200m<sup>3</sup>, 300m<sup>3</sup> and 750 m<sup>3</sup>. Height from existing ground level to top of the ring beam was approximately 16, 19 and 18 meters respectively for above water towers. The shaft thickness was 150mm to 300 mm. All the existing towers were supported on circular raft foundations which were approximately placed about 2m below the existing ground level (For dimensions of tanks refer Fig. 4.6).

#### 3.2 Mathematical Modeling

##### 3.2.1 Modeling for 3 tanks for tank full, 75% fill, 50% fill and tank empty Conditions

In the modeling procedure, the height from existing ground level to top level of ring beam was considered. Also it was assumed that supporting shaft was extended about 2m below the existing ground level.

All the water towers were modeled as two mass models which was proposed by Housner (1963b) and recommended in most of the International codes.

For this modeling purposes 24.5 kN/mm<sup>2</sup> was used as E value applicable to the shaft.

Weight of the top part of the water tower (container) up to the bottom level of the ring beam and height to the center of gravity of the container from the bottom ring beam was found using Auto CAD 2007.

Parameters which required for two mass modes were derived using equations given in ACI 350 (2001)

### **3.2.2 Modeling Tanks for Different Heights**

200m<sup>3</sup>, 300m<sup>3</sup> and 750 m<sup>3</sup> tanks were modeled for 16, 19 and 18 meters heights respectively by following the same procedure described in Clause 3.2.1. However SAP modeling was done only for tank full condition.

### **3.2.3 Modeling Tanks for Different Shaft Thicknesses**

200 m<sup>3</sup> & 300 m<sup>3</sup> tanks were modeled for 150mm thicknesses and 300 mm thickness for 750 m<sup>3</sup> tank by following the same procedure described in Clause 3.2.1. and modeling was carried out only for tank full condition.



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