

**HIGHER TECHNICAL INSTITUTE
NICOSIA - CYPRUS**

**ACADEMIC YEAR 1994/95
CIVIL ENGINEERING DEPARTMENT**

**DIPLOMA PROJECT
No. C/744**

DESIGN OF A WATER TOWER IN CONCRETE

OBJECTIVES:

1. To decide the geometry of the Water Tower
2. To estimate wind loading
3. To analyze and design the Tower
4. To produce construction drawings and connection details

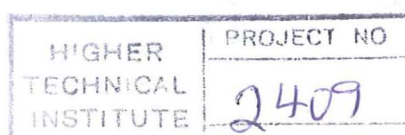
TERMS AND CONDITIONS:

1. Height of tower 20 M.
2. Capacity of tank to be 100m^3 (20,000 gal)
3. Soil bearing capacity 200 KN/m^2
4. High yield steel throughout

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1.3 INTRODUCTION

The water tower will be designed using the British standard BS 8110 (Structural use of concrete) and BS 8007 (Design of concrete structures for retaining aqueous liquids). The design should be carried out using ^{→ ultimate} limit state design. The application of limit state design by BS 8110 is subjected to modifications contained in BS 8007. The limit state design is based on both ultimate and serviceability limit state.

For ultimate limit state the procedures followed are mainly the same as for any other reinforced concrete structure. The characteristic strength of steel should not be taken to exceed 425 N/mm^2 for the water tank. The cover to all steel should not be less than 40mm.

The BS 8007 provides the design procedures for serviceability crack width limit state. The maximum design surface crack widths for thermal and moisture effects are (clause 2.2.3.3 BS 8007):

- (1) Severe or very severe exposure: 0.2mm
- (2) Critical aesthetic appearance: 0.1mm

In this case walls, slabs and beams are classified in the first category with allowable crack width 0.2mm. For roof slab $W=0.1\text{mm}$

The design should also consider the cases where the structure is full of liquid and also when it is empty. The structure when empty must have the strength to withstand pressures from wind load, ^{at both case}

Also cracking may occur not only by thermal or moisture effects but also by flexure (flexural cracking)

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