DESIGN OF R.C.C OVER HEAD TANK

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ABSTRACT

A water tank is used to store water to tide over the daily requirement. In the construction of concrete structure for the storage of water and other liquids the imperviousness of concrete is most essential .The permeability of any uniform and thoroughly compacted concrete of given mix proportions is mainly dependent on water cement ratio .The increase in water cement ratio results in increase in the permeability .The decrease in water cement ratio will therefore be desirable to decrease the permeability, but very much reduced water cement ratio may cause compaction difficulties and prove to be harmful also. Design of liquid retaining structure has to be based on the avoidance of cracking in the concrete having regard to its tensile strength. Cracks can be prevented by avoiding the use of thick timber shuttering which prevent the easy escape of heat of hydration from the concrete mass. The risk of cracking can also be minimized by reducing the restraints on free expansion or contraction of the structure.

INTRODUCTION

WATER TANKS

In water retaining structure a dense impermeable concrete is required therefore, proportion of fine and course aggregates to cement should be such as to give high quality concrete. Concrete mix weaker than M20 is not used. The minimum quantity of cement in the concrete mix shall be not less than 30 kN/m3.The design of the concrete mix shall be such that the resultant concrete issue efficiently impervious. Efficient compaction preferably by vibration is essential. The permeability of the thoroughly compacted concrete is dependent on water cement ratio. Increase in water cement ratio increases permeability, while concrete with low water cement ratio is difficult to compact. Other causes of leakage in concrete are defects such as segregation and honey combing. All joints should be made water-tight as these are potential sources of leakage. Design of liquid retaining structure is different from ordinary R.C.C, structures as it requires that concrete should not crack and hence tensile stresses in concrete should be within permissible limits. A reinforced concrete member of liquid retaining structure is designed on the usual principles ignoring tensile resistance of concrete in bending. Additionally it should be ensured that tensile stress on the liquid retaining ace of the equivalent concrete section does not exceed the permissible tensile strength of concrete as given in table 1. For calculation purposes the cover is also taken into concrete area. Cracking may be caused due to restraint to shrinkage, expansion and contraction of concrete due to temperature or shrinkage and swelling due to moisture effects. Such restraint may be caused by .

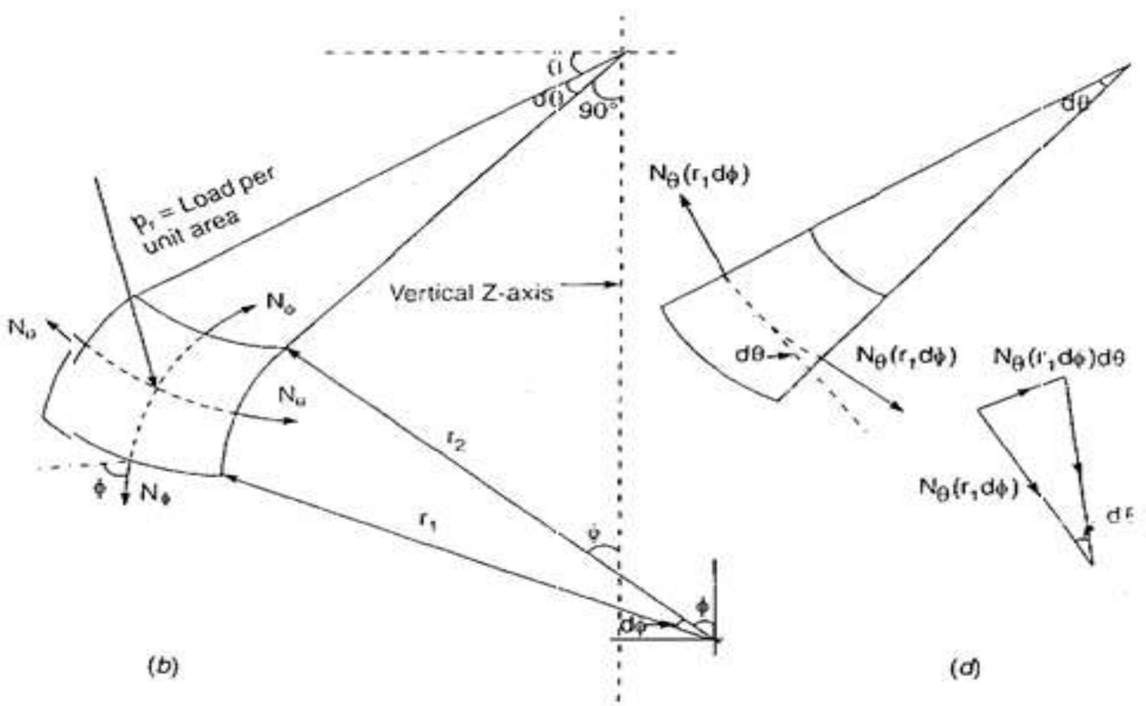
(i) The interaction between reinforcement and concrete during shrinkage due to drying.

(ii) The boundary conditions.

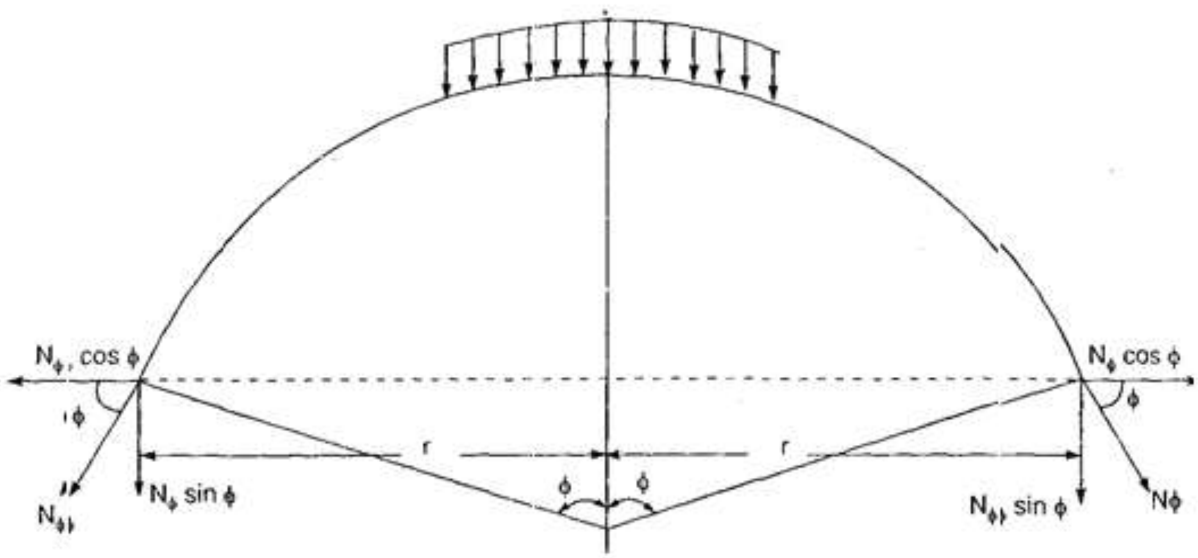
(iii) The differential conditions prevailing through the large thickness of massive concrete

Use of small size bars placed properly, leads to closer cracks but of smaller width. The risk of cracking due to temperature and shrinkage effects may be minimized by limiting the changes in moisture content and temperature to which the structure as a whole is subjected. The risk of cracking can also be minimized by reducing the restraint on the free expansion of the structure with long walls or slab founded at or below ground level, restraint can be minimized by the provision of a sliding layer. This can be provided by founding the structure on a flat layer of concrete with interposition of some material to break the bond and facilitate movement. In case length of structure is large it should be subdivided into suitable lengths separated by movement joints, especially where sections are changed the movement joints should be provided. Where structures have to store hot liquids, stresses caused by difference in temperature between inside and outside of the reservoir should be taken into account.

The coefficient of expansion due to temperature change is taken as 11 x 10-6 /° C and coefficient of shrinkage may be taken as 450 x 10-6 for initial shrinkage and 200 x 10-6 for drying shrinkage.

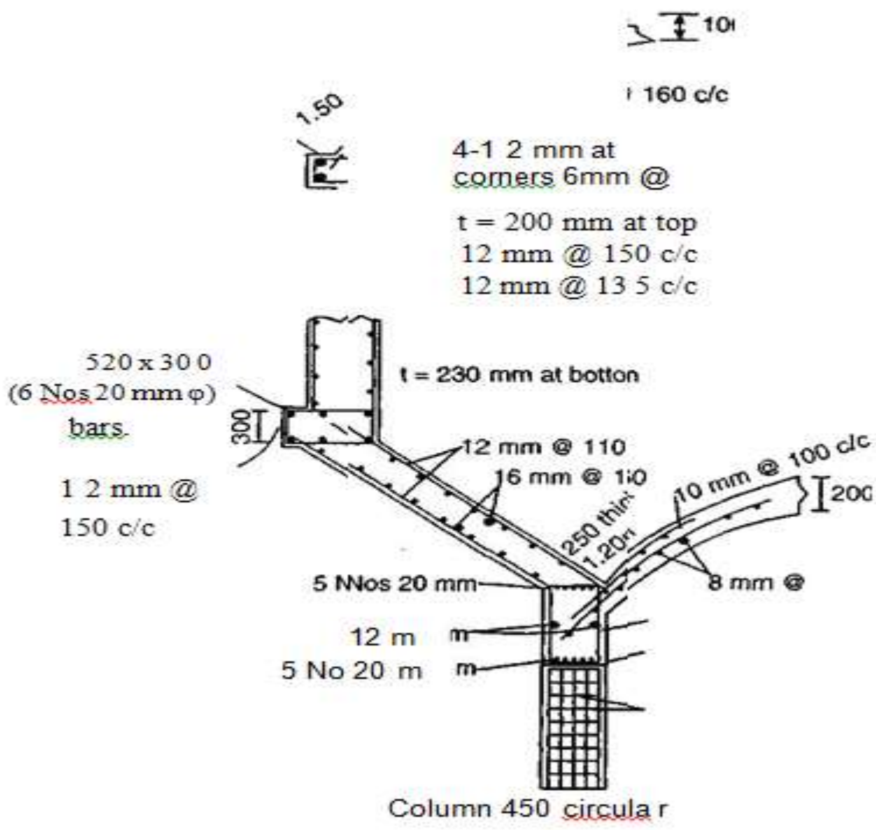


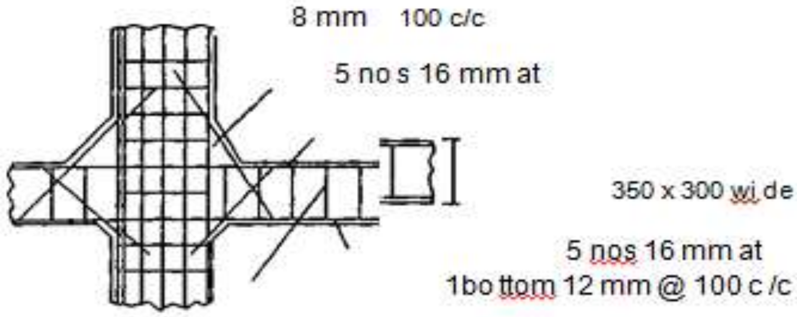
Shell of Revolution.



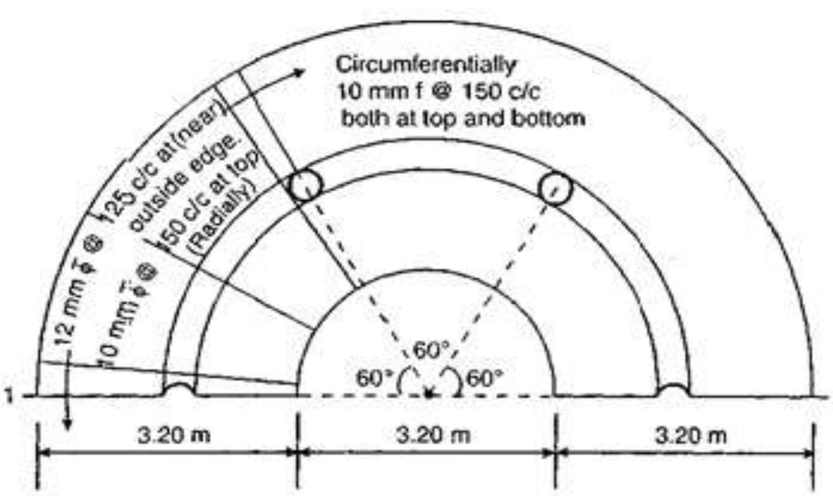
Design

Fig. Forces in s hell





(b) Bracing of Colu mns



ESTIMATION

Detailed estimation:

Detailed estimate is an accurate estimate and consists of working out the quantities of each item of works, and working the cost. The dimensions, length, breadth and height of each item are taken out correctly from drawing and quantities of each item are calculated, and abstracting and billing are done.

Details of measurement and calculation of quantities.

The details of measurements of each item of work are taken out correctly from plan and drawing and quantities under each item are calculated in a tabular form named as details of measurement form.

Estimated cost:

The cost of each item of work is calculated in a tabular form the quantities already computed and total cost is worked out in abstract estimate form. The rates of different items of work are taken as per schedule of rates or current workable rates for finished item of work.

REFERANCES:

		Table	Coefficients for moment in cylindrical wall fixed at base (Per IS3370)					
				Moment =	Coefficient (wH^3) Nm/m			
$_H2$			Co efficient at points					
DT	*0.1 H*	*0.2 H*	*0.3 H*	*0.4 H*	*0.5 H*	*0.6 H*	*0.7 H*	*0.8H*
0.4	+ 0.0005	+ 0.0014	+ 0.0021	+ 0.0007	- 0.0042	-0.0150	-0.0302	-0.0529
0.8	+ 0.0011	+ 0.0037	+ 0.0063	+ 0.0080	+ 0.0070	+ 0.0023	+ 0.0068	-0.0024
1.2	+ 0.0012	+ 0.0042	+ 0.0077	+ 0.0103	+ 00112	+ 0.0090	+ 0.0022	-0.0108
1.6	+ 0.0011	+ 0.0041	+ 0.0075	+ 0.0107	+ 0.0121	+ 0.0111	+ 0.0058	-0.0051
2.0	+ 0.0010	+ 0.0035	+ 0.0068	+ 0.0099	+ 0.0120	+ 0.0115	+ 0.0075	-0.0021
3.0	+ 0.0006	+ 0.0024	+ 0.0047	+ 0.0071	+ 0.0090	+ 0.0097	+ 0.0077	+0.0012
4.0	+ 0.0003	+ 0.0015	+ 0.0028	+ 0.0047	+ 0.0066	+ 0.0077	+ 0.0069	+0.0023
5.0	+ 0.0002	+ 0.0008	+ 0.0016	+ 0.0029	+ 0.0046	+ 0.0059	+ 0.0059	+0.0028
6.0	+ 0.0001	+ 0.0003	+ 0.0008	+ 0.0019	+ 0.0032	+ 0.0046	+ 0.0051	+0.0029
8.0	0.0000	+ 0.0001	+ 0.0002	+ 0.0008	+ 0.0016	+ 0.0028	+ 0.0038	+0.0029
10.0	0.0000	+ 0.0000	+ 0 0001	+ 0.0004	+ 0.0007	+ 0.0019	+ 0.0029	+0.0028
12.0	0.0000	+ 0.0000	+ 0.0001	+ 0.0002	+ 0.0003	+ 0.0013	+ 0.0023	+0.0026
14.0	0.0000	0.0000	0.0000	0.0000	+ 0.0001	+ 0.0008	+ 0.0019	+0.0023
16.0	0.0000	0.0000	-0.0001	- 0.0002	-0.0001	+ 0.0004	+ 0.0013	+0.0019

REFERENCE BOOKS:

- I.S 496:2000 for RCC.
- I.S 800:1984 for STEEL.
- I.S 872 Part I and Part II.
- I.S 3373 (Part IV-1967).
- Rein force concrete structures (Dr B.C PUNMIA).
- Element of environmental engineering (BIRIDI).