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1. Elevated Water Tank near Bangalore (India)

Owners: Ashok Leylands Limited
Architects: Pithavadian and Partners
Consulting engineers: GERAME, Bangalore
Contractors: The Engineering Design and Constructions, Bangalore

Construction duration: 5 months
Service date: 1980

Introduction

An RCC Overhead Water Tower of capacity 2,500,000 liters on 20 m staging combined with underground reservoir of same capacity was proposed and timebound tenders were called by the architects on behalf of the owners with an option for contractors own design. The time limit for the completion of both the tanks including servicing was five months. The Contractor was awarded the work on their designs, using for the first time in India the suspended roof cast with ferro-cement, which was found to be lower by over 30% in cost, compared to departmental design. The construction of the suspended roof was over within a week's period.

Design

Governed completely by economical considerations, foundations for this water tower was designed as a raft, keeping it independent of the foundation of the underground reservoir.

The conical container was designed as a frustrum of a cone for hydrostatic pressure and suspended roof load. The top vertical portion of the container was designed to resist both hoop compression and bending stresses induced by the suspended roof.

The top roof was designed as a suspended member with structural form of a shallow spherical shell using the light-weight ferro-cement material.

The dip of the shell was kept at 1/20 of the shell diameter to keep the stresses at the joint within the allowable limits as per standard codes of practice.

Construction

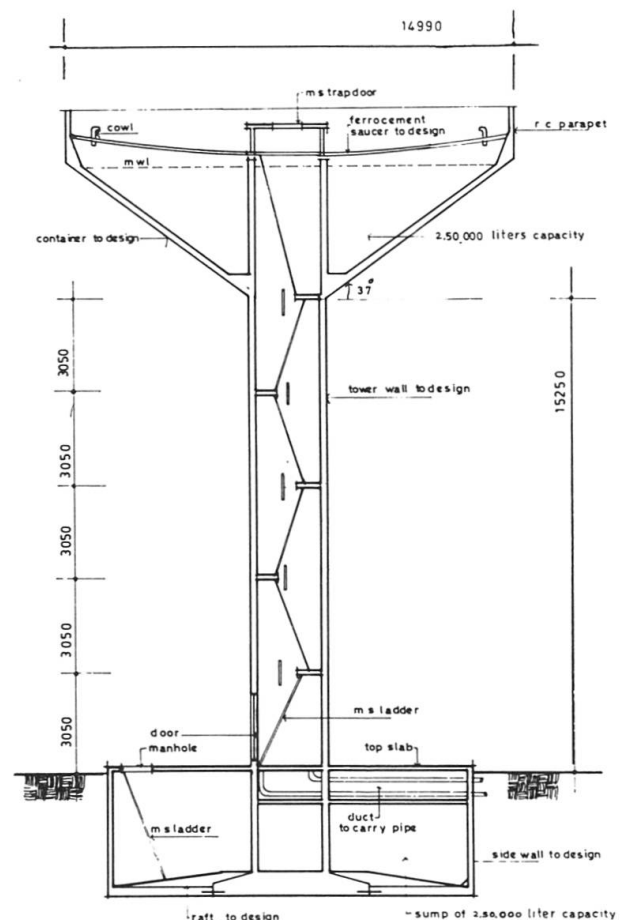
Foundation of the water tower was cast separately without connecting to the floor slab of the underground reservoir except through PVC water bar and dowel bars. After completing the underground reservoir including a duct in the roof for taking water pipe, the RCC circular hollow shaft was cast using climbing formwork. Formwork for conical part of the container was fixed over pipe staging.

The suspended roof with 4 cm thick connected all round to the top circular ring by cold twisted deformed bars 8 mm dia. of grade 415 (415 N/mm^2) reinforced both radially and circumferentially. Two layers of welded wire mesh of 20G, 12.5 mm c/c both ways one at top and other at bottom of the steel skeleton, were provided and cement mortar in proportion of 1 : 2.2 with water cement ratio of 0.4 was applied around the steel skeleton and mesh to a finish thickness of 4 cm.

All piping including the drain pipe from roof was taken inside the shaft and carried through horizontal duct provided in the roof slab of the ground level reservoir. Ladders with RCC landing and water level indicators were also provided inside the shaft.

The surfaces in contact with water were plastered with cement mortar mixed with water proofing compound. All other surfaces were of exposed form finish.

(H. R. Viswanath. H. K. Nanjunda Swamy.)



Section



Water tank with ferro-cement suspended shell roof near Bangalore