Water tower in Cutro (Italy)

Autor(en): **Aeberhard, H.U.**

Objekttyp: **Article**

Zeitschrift: **IABSE structures = Constructions AIPC = IVBH Bauwerke**

Band (Jahr): **6 (1982)**

Heft C-22: **Water towers**

PDF erstellt am: **20.09.2024**

Persistenter Link: https://doi.org/10.5169/seals-17595

6. Water Tower in Cutro (Italy)

Owner:	*Cassa per il Mezzogiorno, Ufficio Acquedotti della Calabria, Catanzaro*
Engineers:	*R. Brusa and R. Zaboia*
Contractor:	*Codelfa S.p.A., Milan*
Lifting:	*VSL Italia s.r.l., Milan*
Construction period:	*1980*

In southern Italy, more exactly in Cutro (Catanzaro), a water tower with a capacity of 2000 m^3 drinking water has been built. In the invitation for tenders, the capacity, upper filled level and maximum depth of the vessel were specified as the limiting conditions. In addition the thermal protection of the vessel was to be investigated and account had to be taken of the fact that the structure would be located in earthquake zone 2.

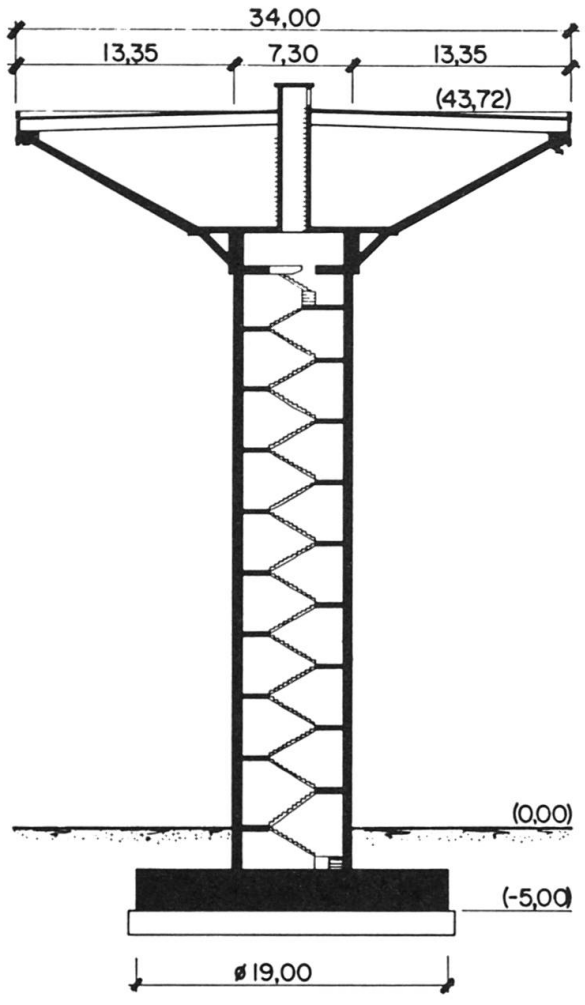

Fig. 1. Cross section of the tower

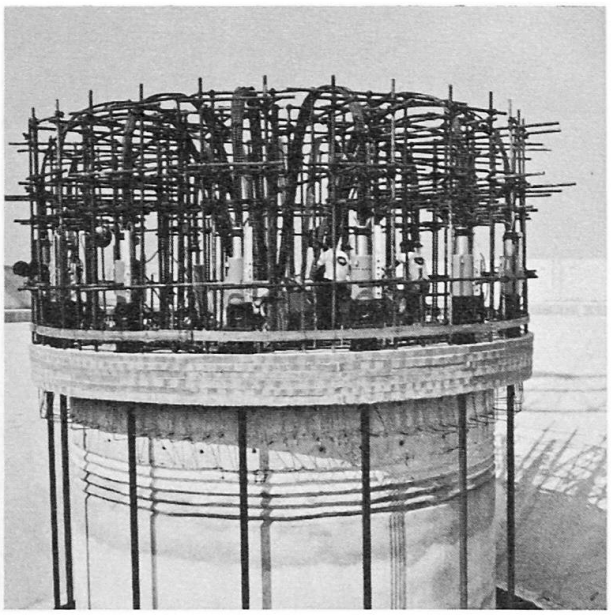

Fig. 2. View of the VSL lifting units on top of the tower shaft.

On this basic information, an economical, structurally correctly designed solution that would harmonize with the environment had to be found, which could be constructed using techniques with which the contractor was familiar.

This resulted in a water tower with a 38.50 m high shaft of 7.30 m external diameter and 0.55 m wall thickness, on which a conical shell of 34 m diameter is seated. The shell's angle of slope to the horizontal is 26.5°. The wall thickness of the shell decreases outwards from 0.40 to 0.25 m. Its external structuring was obtained by prefabricated elements, onto which the actual shell was concreted. The roof slopes slightly towards the outside. The roof also is composed of prefabricated ribbed slabs, resting internally on a central cylinder and externally on the edge of the vessel. The entire vessel was thermally insulated.

Construction of the tower shaft and of the high-level vessel was carried out separately, but concurrently. While the wall of the shaft was raised in steps of 1.87 m height with climbing formwork and the stairs were installed, the prefabricated elements were manufactured on the site. The elements for the external skin of the vessel shell were set up on the ground on a steel framework and thus constituted the form for the shell. The reinforcing steel was then placed and the shell was concreted. The separation of the construction operations for the shaft and vessel resulted in a shortening of construction time by approximately 170 working days.

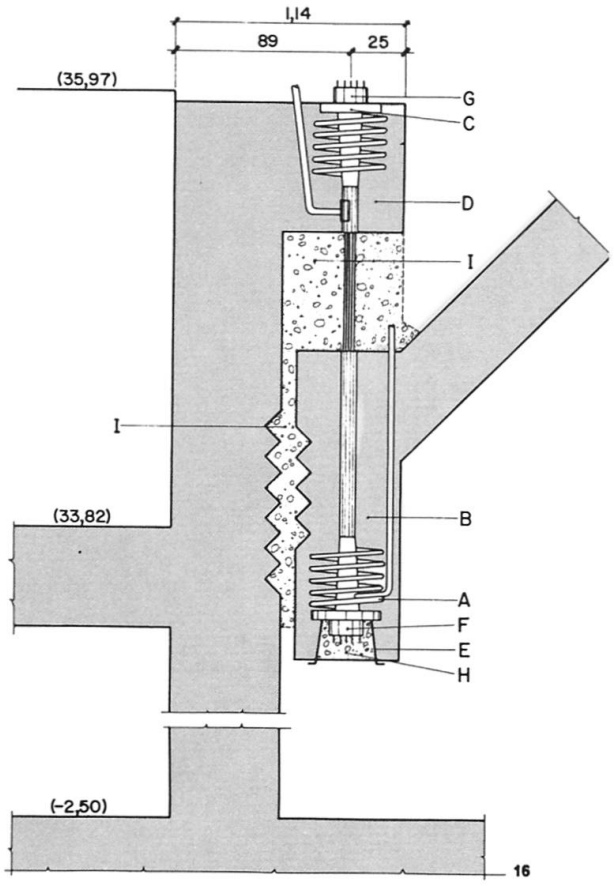

Fig. 3. Detail of final shell connection to tower shaft
A = spiral; B = shell; C = bearing plate; D = ring beam of tower shaft; E = blockout former; F = lower anchor head; G = upper anchor head; H = filling concrete; I = jointing concrete between tower and shell

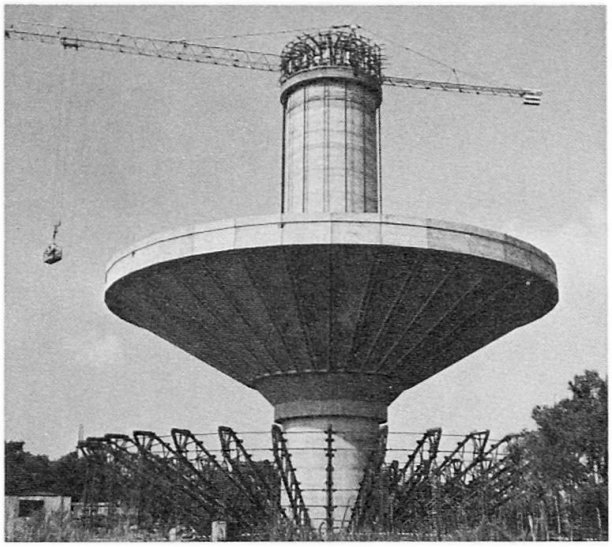

Fig. 4. Shell during lifting

The shell, which in this condition had a weight of 1300 tonnes, was lifted with 15 VSL motive units of type SLU-120. The lifting units were mounted on an annular beam at the upper end of the shaft. The setting up to the lifting units and strand bundles (12 strands ∅ 15 mm per bundle) took five days. Two days were required for the lifting operation itself, three days for dismantling the lifting equipment. The average speed of lifting was 2 m/h. After the lift had been completed, the projecting strand ends were cut off, the remaining strands anchored and the shell and shaft connected together by in-situ concrete. The small cylinder in the centre of the tower was then concreted, after which the roof elements could be positioned. A second water tower was subsequently constructed in the same way in another place of the same region.

(H. U. Aeberhard)

(drawings published with authorization from L'Industria Italiana del Cemento – 9/81)