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9. TV Tower and Transmitter Building at Varanasi (India)

Owner:	<i>Directorate General, All India Radio</i>
Contractor:	<i>Nabin Designers and Constructors Private Limited</i>
Design & Construction Consultancy:	<i>STUP</i>
Works duration:	<i>18 months</i>
Service date:	<i>1985</i>

Conventional permanent safety measures such as aviation warning lights and lightning arrestors are also provided. The tower is surrounded by a one-storeyed circular transmitter building of 600 m² plinth area, which consists of a reinforced concrete framed structure with in-fill brick walls. The architectural designs of the tower and the surrounding building have been done in such a way as to have a pleasing blending of the two forms.

(S. R. Mangalgiri)

As part of the drive by Doordarshan to cover the entire country by a TV network, broadcasting stations are being set up in a number of cities. The TV tower at Varanasi forms part of this network and is also used for micro-wave relay.

This 150 m tall TV tower comprises a circular RCC tower of 106.5 m height topped by a square steel mast of 43.5 m height. The thin shell of the RCC tower tapers in diameter from 11.5 m at the bottom to 5.9 m at the top. The steel mast is in two sections, the lower 25 m high section being with 2.5 m outer dimension and upper 18.5 m high section being with 1.2 m outer dimension. There is a provision for increasing the tower height in future by further 23 metres to a total height of 173 m using a 0.6 m wide steel tower. A steel staircase inside the RCC tower provides access to the top of the RCC tower and also acts as a liftwell of 2 m × 2 m size for future provision of a lift. Three cantilevering external platforms are provided at 40 m, 80 m and 100.5 m elevations.

The foundation consists of an annular raft pile cap resting on 156 under-reamed piles, 40 cm in diameter and 8.5 m long with 2 bulbs. The configuration of the foundation was optimized so as to have minimum materials in the foundation, consistent with safety, particularly with respect to the allowable bearing pressures.

The tower was designed for realistic wind load conditions based on a 50 year return period with a basic wind pressure of 175 kg/m² at 30 m height and a gust factor of 1.35 on the dynamic portion of the wind. An interesting aspect of this structure is its slenderness, particularly for the steel mast for which the height to base centreline dimension is as high as 21. The four legs of the steel mast are connected to the concrete cap of the RCC tower through a steel grillage structure below each of the four legs. At each leg the base plate of the mast is connected to the grillage through 56 high strength friction grip bolts and the grillage is embedded in the reinforced concrete cap through proper anchors.

The jump form technique was used for the construction of the tower. The steel mast was fabricated and galvanised in the shop and erected piece by piece after hauling up the pieces using inclined ropeways.

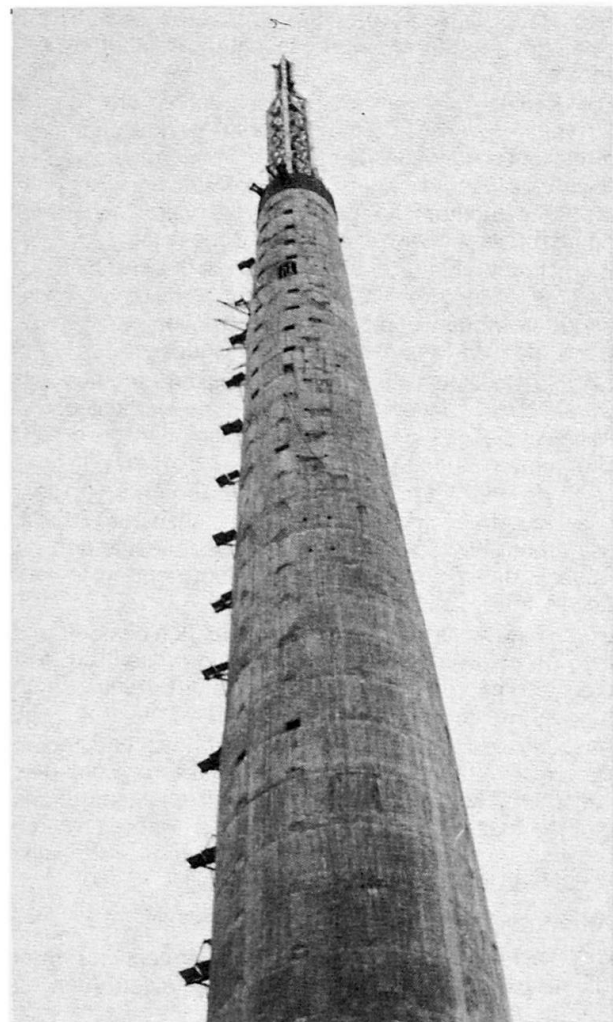


Fig. 1 Varanasi TV Tower

Note

Similar towers have also been built in Ahmedabad (H: 150 m) and Bangalore (H: 140 m).

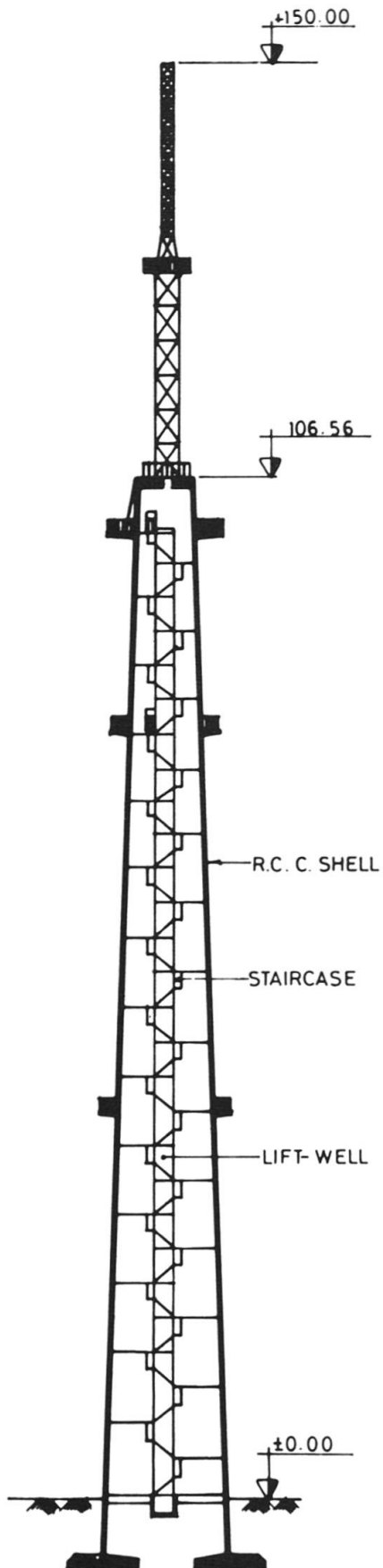


Fig. 2 Elevation Varanasi TV Tower

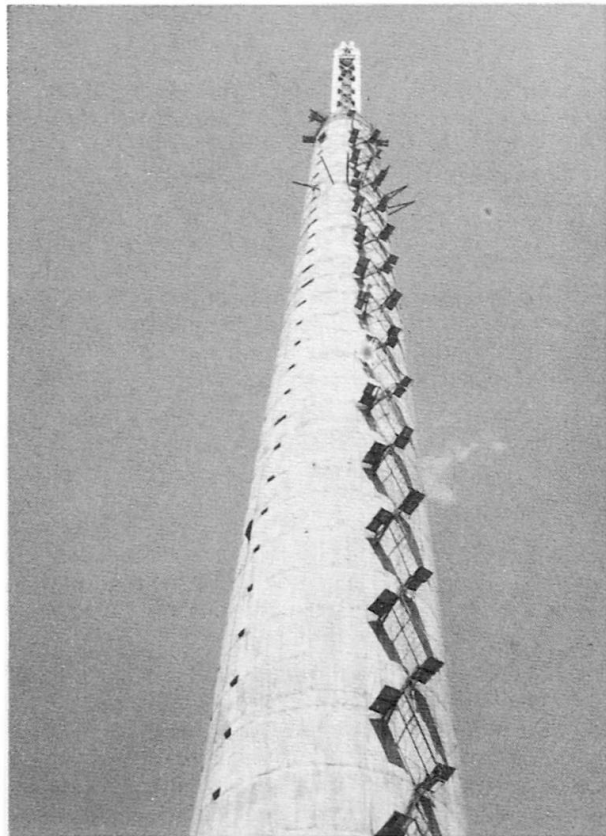


Fig. 3 Ahmedabad TV Tower

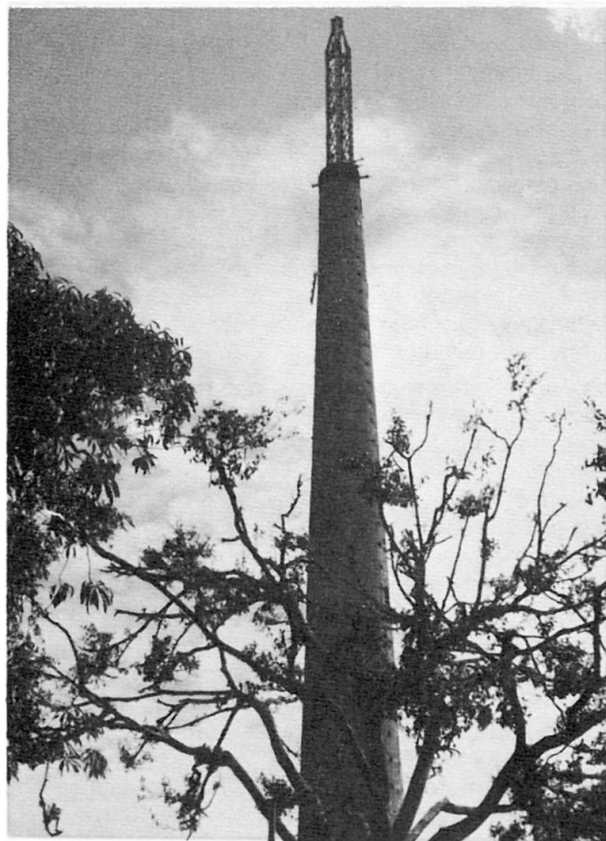


Fig. 4 Bangalore TV Tower