Pile Foundations Save Transmission Towers At Agra

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The shifting of course of the Yamuna River at Agra by over 800m during the last four years had threatened the stability of transmission towers of a 220 KV - transmission line on the river bank. After last year's monsoons, the river had shifted dangerously close to the existing towers.

As per the estimates, the depth of maximum scour was as much as 15.5m. Four towers were under immediate threat of inundation. The open foundations of these towers were exposed to the risk of being washed away due to scouring and erosion of the soils.

Cengrs Geotechnica Private Limited was awarded the design and construction contract for providing deep pile foundations for the towers that extended below the level of maximum scour. In order to ensure minimum disruption of power supply, the new towers were first installed and then charged, after which the existing towers were dismantled.

The four existing towers were replaced by three new towers along the 1.2km section along of the river bank. The new foundation system was installed in between the river bank and the existing towers. Some of the piles were as close as just 2m away from the edge of the river bank.

The foundations for the new towers consisted of 1m diameter bored cast-in-situ piles of 24 to 26m depth below

Fig 1 : Foundations Of Existing Transmission Towers Threatened By The Meandering River Yamuna.

Fig 2 : Construction Of Piles By Direct Mud Circulation For New Tower Foundations.

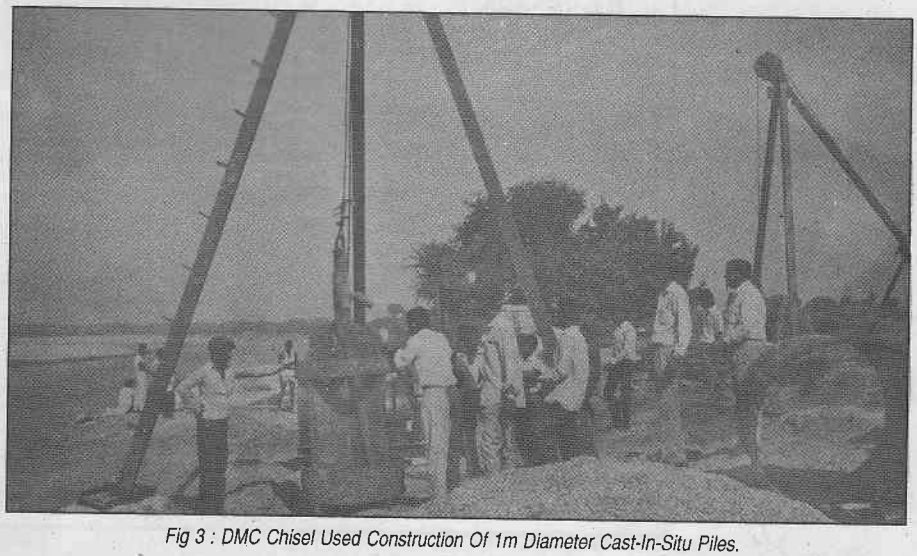

Fig 3 : DMC Chisel Used Construction Of 1m Diameter Cast-In-Situ Piles.

the cut-off level, (about 25 to 29m below ground surface). Four piles were installed below each leg. The pile caps for each of the four legs of each tower were interconnected through a strap beam.

The pile cap dimensions were 4.5m by 4.5m by 1.2m. A 1.2m diameter circular pedestal/chimney, 1.6m high, was constructed over each pile cap on which the stub of the tower was set.

The structural analysis was done by space frame analysis in order to economise the design of the foundation system. The design yielded a cost saving of about 25 percent on the original estimated/ contracted cost of Rs 138 lakhs.

Cengrs successfully installed the new foundations system for the three towers in record time. The towers were then erected and charged well in time for the next monsoons so that the towers are safe even during floods and erosion/scour of the soils. ■

Fig 4 : Pile Cap Completed Over 4-Pile Group To Take Load From One Leg Of The Tower.

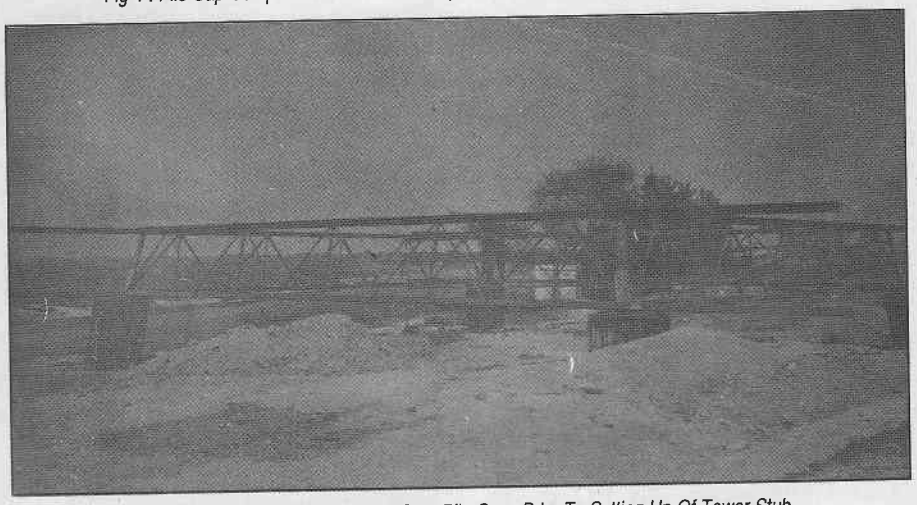

Fig 5 : Four Pedestals Being Cast Over Pile Caps Prior To Setting Up Of Tower Stub.