Second Thane creek road bridge, Bombay, India

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Second Thane Creek Road Bridge, Bombay, India

Deuxième pont-route sur la Thane Creek, Bombay, Inde

Zweite Thane Strassenbrücke in Bombay, Indien

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1. GENERAL FEATURES

This 1.835 km long 6 lane bridge across Thane Creek links Bombay and New Bombay. The bridge has two independent decks, each 12.37 m wide and supporting 3 lanes of traffic.

2. SUPERSTRUCTURE

The superstructure is in six continuous units, each continuous over maximum four spans, with a typical length of 321m for the unit. Each of the two decks consists of a single-cell prestressed concrete box girder of depth varying from 3.5m to 7 m. A continuous superstructure with spans of this order constructed by cantilever construction is probably the first of its kind in India. Each deck supports one carriageway for three traffic lanes, a 1.2 m wide footpath and a median verge and a maintenance walkway below the deck slab. The prestressing tendons are located only in the deck slab and soffit slab, keeping the webs free of any cables to facilitate concreting of the deep webs.The superstructure is built by the in-situ balanced cantilever construction method. For typical intermediate units cantilever arms are built up on either side of the three intermediate piers symmetrically and connected in between by key segments. At the two outer ends of this continuous unit, the deck will simply rest on expansion joint piers since hinges/articulations have been prohibited and additional internal counterweight consisting of cast in-situ PCC will be provided to ensure positive reaction at these supports for all loading conditions.

3. SUBSTRUCTURE AND FOUNDATIONS

The superstructure rests on four POT-PTFE sliding bearings with a centrally located lateral restraint. The RCC pier cap is located over a tapering RCC pier which rests on a RCC circular pedestal and a PCC plug cast inside a cavity excavated inside rock to minimum 1.5 m depth. Such open foundations are provided for all foundations except two at one end of the bridge for which caisson/well foundations have been provided.

Two alternative methods are used for the construction of the open foundations in the creek with water depths ranging upto 10 m. In the first method a short height (equal to depth of bed material) thin-shell concrete cofferdam is cast near the shore on a pontoon. The pontoon is towed to the required location and the cofferdam is lifted off the barge and lowered in position using a specially

designed floating gantry. It is extended upwards with hollow segments of steel cofferdam during the lowering process. Thereafter the materials inside the cofferdam are excavated. A concrete seal is provided at the interface between the cutting edge of the cofferdam and rock, thus forming a barrier against water infiltration. Rock cutting, casting of PCC are generally done under dry condition and the upper RCC elements are always under dry condition. Once the RCC pier comes above high water level the steel cofferdam is dismantled and taken away for reuse. In the second method the sacrificial concrete cofferdam is sunk down to rock, like in conventional well sinking from a sand island formed inside a steel sheet-pile enclosure and the balance operations are similar to the other method.

4.DURABILITY MEASURES

In view of the highly aggressive and polluted marine environment, a number of precautions have been taken for enhancing the durability. In general, a four-stage anticorrosive treatment to all reinforcing bars, additional surface protective treatment for all elements in the form of m.s.liner/epoxy-based paint/sacrificial concrete cover, minimum concrete thicknesses, minimum concrete grade and cement content, high degree of quality control on materials, proper drainage of the deck etc. have been adopted.

5. ACKNOWLEDGEMENTS

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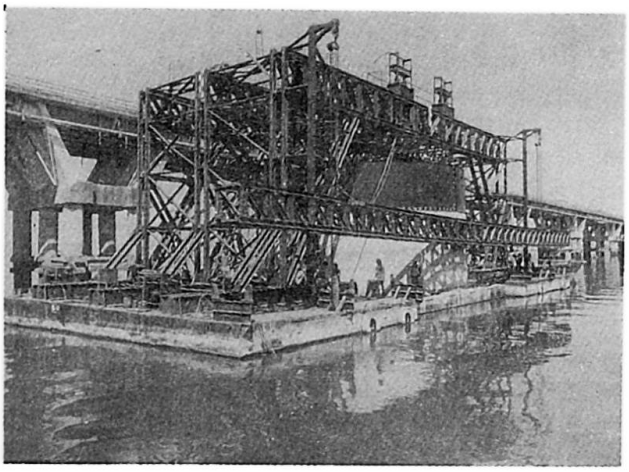

Fig. 1 Floating Gantry with Cofferdam Assembly

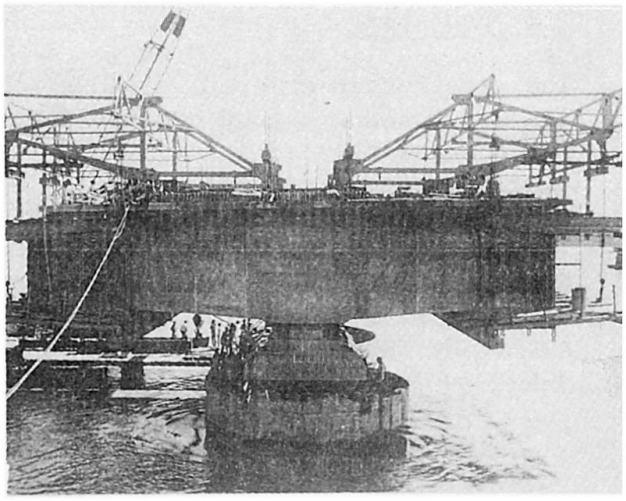

Fig. 2 Superstructure under construction