Design of Skew Submersible Bridge on Bengu Chechi Samron Ka lewa Road across Brahmani River

PREAMBLE

Type of Bridge

The bridge shall be a Submersible bridge. The HFL is 101.500 m and the proposed deck level is 102.500 m. Looking to the plinth levels of existing structures on the both approache; the free board is not provided in accordance to IRC:5-1998 Clause 106.2.1 only for this reason it is a submersible bridge; for all traffic movement purposes it is all weather bridge. During the highest flood the water will just touch the deck slab but will not overtop it.

Decking Arrangement

The Deck Slab shall standard RCC deck slabs each 12000 mm wide i.e. 7500 mm carriage way and Footpath and Railings on both sides. There shall be 25 mm wide expansion joint between the adjacent deck slabs along the length of the bridge. The location of proposed road is right angle to the direction of flow.

There shall be 7 Nos. of spans. The centre to centre distance for the spans shall be 10.8 m.

Standard RCC Solid Slab Superstructure with 30 Degree Skew with right effective span 10 M with footpath shall be provided in accordance to the Ministry of Surface Transport (Roads Wing), New Delhi drawings. [Drawing No. SD/112].

It is proposed to construct 12000 mm wide slabs as per these standard drawings. As per requirement of use in the proposed bridge the deviation with respect to these drawings shall be as follows:-

1. Pier Cap Width 1200 mm [In the reference drawing the pier cap width is 800 mm]. The width of piers shall be 1200 mm. Due to this change the Centre to Centre distance shall be 10800 mm (centre to centre over piers). For all spans the clear span shall be 9600 mm and the centre to centre distance shall be 10800 mm. The length of reinforcement shall be modified as per these geometrical requirements however spacing of the reinforcement shall not be altered.

2. Footpath & Railing: - As per drawing No. SD/102, SD/103, Sd/104, SD/105 and SD/106.

3. Reinforcement Detailing: - The reinforcement detailing is suitably modified as required for the modifications referred above in points 1.

The proposed decking arrangement is shown in Drawing – D-01 titled as Decking arrangement.

Design Loads

The following loads have been considered in the design of deck slab and for the stability of the sub structure:-

[A] Maximum of the following cases

I. One lane of IRC class 70R on carriage way
II. One lanes of IRC Class A on carriage way
III. Two lanes of IRC Class A on carriage way
IV. Three lanes of IRC Class A on carriage way

V. One lane of IRC class 70R and one lane of IRC Class A on carriage way

VI. One lane of IRC class AA TRACKED VEHICLE on carriage way

[B] Other Loads

a) Footpath load of 5KN/Sqm.

b) Wearing coat land of 2 KN/Sqm.

Safe Bearing Capacity

The detailed sub soil investigation report for a bridge constructed in the vicinity of the bridge is enclosed.

The foundation rock is safe against the eroding effects of the water flow and other climatic conditions.

As per detailed test of foundation rock the lowest safe bearing capacity for rectangular footing at depth 2.5 m and downwards is 350 kN/ Sq M; Hence the Safe Bearing Capacity adopted for design is 350 kN/ Sq M.

Depth of Foundation/Founding Level

For all the footings hard rock is available hence the foundation shall be laid at 1.5 m depth embedded in rock.

Scour Depth

The maximum scour depth computed is 7.04 M. As per Clause No. 703-2-3-1 of IRC 78-1983 considering Scour at the pier two times of calculated scour depth below the highest flood level. But we shall provide foundation at 1.5 m ANCHORED IN BED ROCK AVAILABLE.

Reinforcement Detail & other Detail of Deck slab

Ministry of surface transport details drawings are enclosed which contains miscellaneous details of deck slab including reinforcement drawing.

The right effective span of the proposed bridge is 9.60 m. The length along the centre line of road between pier centers is 10.80 m.

The deck slab pertaining to 10 m. right effective span shall be provided as given in MOST drawings No. SD/101, SD/102, SD/103, SD/104, SD/105, SD/106 and SD/122.

In the drawing the clear right span is 9600 mm. The proposed bridge shall have clear right span as 9600 mm conforming to the standard drawing adopted.

Bearing detail

Tar paper bearing shall be providing on top of pier cap & abutment cap.

Approach slab

The detail of approach slab is enclosed as drawing JK-03.

Pier Cap Detail

Pier cap drawing is enclosed as annexure JK-05.