Zeitschrift: IABSE structures = Constructions AIPC = IVBH Bauwerke

Band: 8 (1984)

Heft: C-29: Structures in Canada

Artikel: Clarence L. Gossa Bridge (Nova Scotia)

Autor: Franklin, D.H.

DOI: https://doi.org/10.5169/seals-18815

1. Clarence L. Gosse Bridge (Nova Scotia)

Owner: *Nova Scotia Department of Transportation*

Consultants: *Whitman, Benn & Associates Ltd. of Halifax, N.S. in conjunction with Dickerhof-Widman of Munich and New York*

Substructure Contractor: *Robert McAlpine (Toronto) Limited*

Superstructure Contractor: *Collavino Incorporated*

Contruction Time: *24 months*

Service Date: *1979*

General

The Clarence L. Gosse Bridge spans the Shubenacadie River. The Shubenacadie is a tributary of the Bay of Fundy and the large tides and swift current for which the Fundy is noted played a major role in determining the span lengths and type of construction for the bridge.

The river channel at the site is 420 m wide under high tide conditions and 91 m at low tide. The tidal range is 10 m with currents varying from 1.8 to 3.6 m/sec. In the winter ice floes, raft ice and shore ice build-up increase the construction problems.

A number of alternative structural systems and variety of spans were analyzed. The most economic and feasible alternative proved to be a concrete hollow box, post-tensioned girder using the free cantilever method of construction. The span lengths developed were 113.4 m; 213.4 m and 113.4 m providing a total length of bridge of 440.2 m. At the time of construction and until 1983 the 213.4 m center span was the longest span in North America constructed using the free cantilever method.

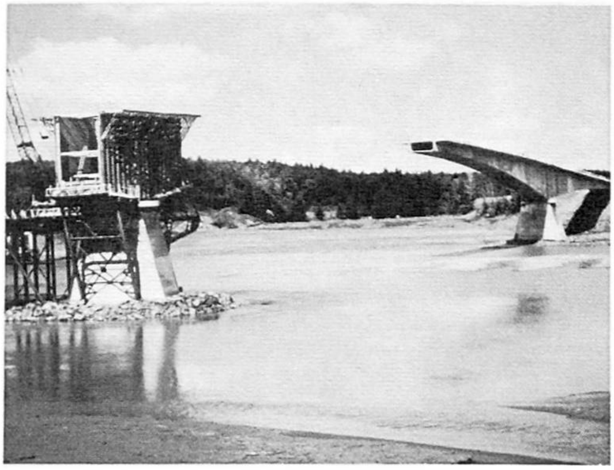

Fig. 2 West pier table at low tide

Fig. 1 East span advancing under winter conditions

Substructure

The abutments are conventional "U" shaped concrete walls founded on H piles carried to bedrock.

The piers were designed to be constructed in the dry on bedrock within a steel sheet piled caisson. The piled caisson measured 21 m × 10.6 m in plan with the sheet piling designed to resist a 19.8 m head of water. Arbed HZ50 piling were used with internal bracing frames. The east pier was built on bedrock; however, the west pier required a design revision as the bedrock sloped quickly away from the pier site. The redesign required that 184 H-piling be driven inside the sheet piled caisson, a 3.7 m tremie plug used and only then was the pier constructed in the dry as for the east pier.

The pier stem is streamlined in plan and sloped in elevation to provide an ice breaker system. The nose of each pier is protected with 25 mm steel plate shaped to the streamline surface. The sides of the piers are covered with a 100 mm thick sacrificial concrete jacket. This jacket provides protection to the structural concrete of the stem from the abrasive action of the river water and winter ice and can be repaired or replaced quite readily.

In the substructure a total of 3975 m^3 of 28 MPa concrete and 136 tonnes of reinforcing steel was used.

Superstructure

The free cantilever system chosen provided the means of constructing the superstructure without falsework using travelling forms to keep any work out of the River.

The piers contained steel inserts on which the falsework for the pier table was erected. The pier table contained 354, 32 mm Dywidag deformed tendons which had a yield strength of 1034 MPa. Each tendon was stressed to 58 tonnes. The final sections cast at the centre joint contained only 10 tendons, the other tendons being systematically terminated at given locations.

The east half of the superstructure was erected during the winter and was completed within 6 months. Winter work complicated the placing of concrete as the travelling form had to be insulated and the concrete heated. The east half was completed 9 months ahead of the west half. The meeting of the two halves took place in late 1978.

The dimensional parameters of the box girder was as follows:

deck width overall: 10.62 m
roadway width: 9.75 m
box girder width: 6.10 m
box girder depth: from 2.44 m to 10.7 m at the piers
web thickness: constant 356 mm
bottom slab: from 150 mm to 1.68 m
only diaphragm occured at the pier table
the centre joint was a hinged configuration.

In total, 5500 m^3 of high strength concrete was used in the superstructure along with 664 tonnes of 32 mm tendons.

The structure officially opened for traffic July 1979 and named after a prominent Nova Scotian and former Lieutenant Governor Doctor Clarence L. Gosse.

(D.H. Franklin)

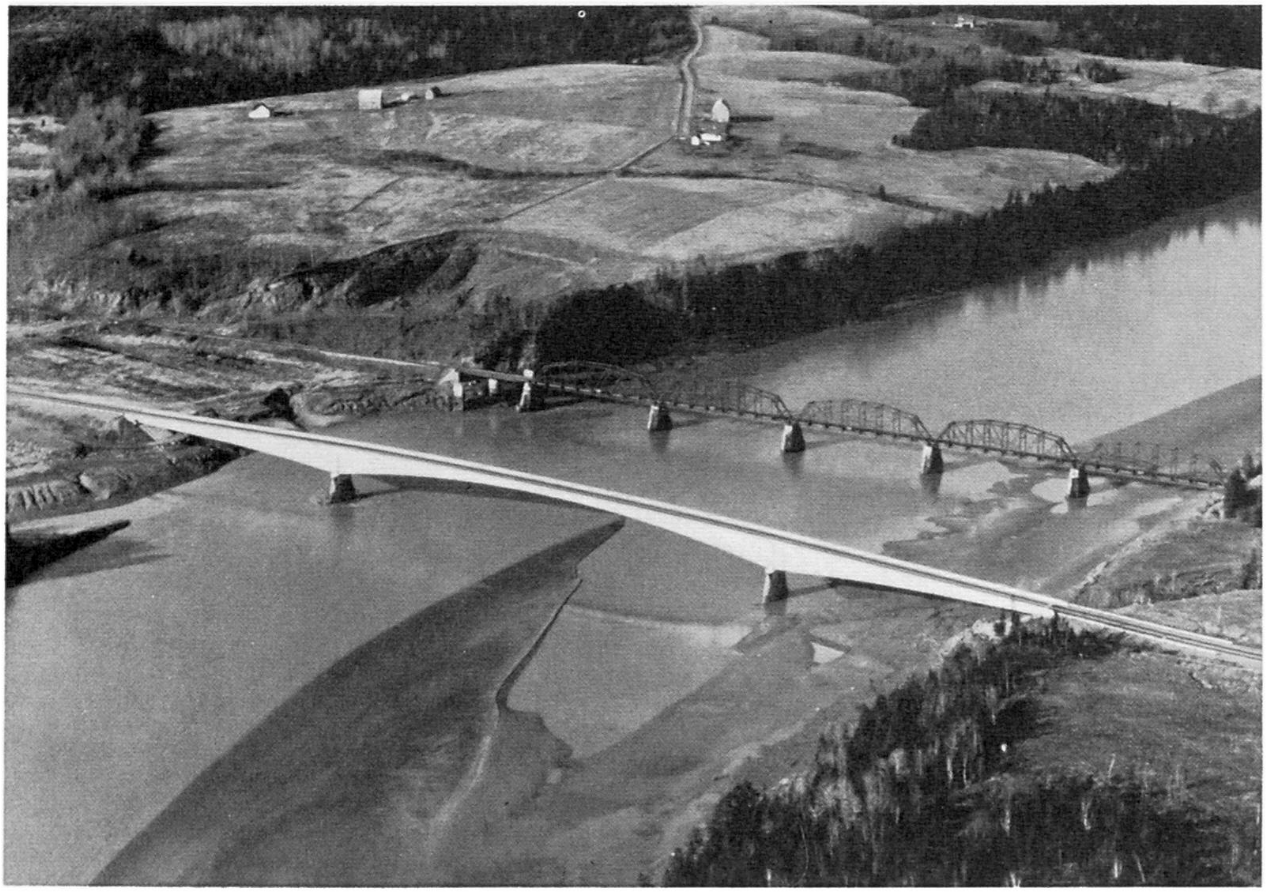

Fig. 3 Completed structure