

Innovative Expansion Joint Replacement for Burlington Bay Skyway

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Abstract

The innovative expansion joint replacement design for the Burlington Bay Skyway Northbound Structure in Hamilton, Ontario resulted in substantial economic and social benefits. The existing modular expansion joints were distressed and at the end of their service lives. Joint replacement was complicated by several constraints, including high traffic volumes, limited detour options, a restriction against full closures of the bridge, a moratorium by the client agency on splicing modular joint assemblies, and the limited available load capacity of the structure. The bridge articulation was modified and the existing breather joints were mobilized to reduce movement at 16 modular expansion joints. This allowed these joints to be successfully replaced with an innovative prefabricated module expansion joint assembly incorporating a single strip seal. The design minimized traffic closures and disturbance to the public, while also realizing substantial cost savings.

Keywords: expansion joint, innovative, modular, prefabricated, bridge design

1 Introduction

Owned and operated by the Ministry of Transportation Ontario (MTO), the Burlington Bay Skyway (BBS) Northbound Lane (NBL) structure is a high-level structural steel bridge constructed in the 1950s. The 2.56 km bridge carries four lanes of Queen Elizabeth Way (QEW) traffic over the shipping channel connecting Hamilton Harbour and its vital industrial ports to the Great Lakes and St. Lawrence Seaway system. The main span over the shipping channel is a through truss arch with truss anchor span at either end. The approach

spans consist of 4 below-the-deck trusses for high-level spans (up to 79.4 m length), four propped plate girders for lower spans (up to 26.5 m length), and rolled girders for short approach spans (up to 19.9 m length).

After the twin Southbound Lane (SBL) bridge was constructed in the mid-1980's, the original bi-directional bridge was converted to the current NBL only configuration. The conversion included a complete replacement of the dual decks with a single contiguous deck. The original structural articulation was retained, including 22 expansion joints to allow linear thermal movements and 21