

## Paper ID:4421

# Main Cable Inspection and Strength Evaluation of Helicoidal Strand Main Cables Using a Modified NCHRP Evaluation Approach

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## ABSTRACT

The A. Murray MacKay Bridge (MacKay Bridge) opened to traffic in 1970 and carries four lanes of traffic over the Halifax Harbour between Dartmouth and downtown Halifax, Nova Scotia, Canada. The Bridge's main cable has been opened for detailed visual inspections several times beginning in 2002. The Owner, Halifax Harbour Bridges, retained COWI North America to perform a strength evaluation in accordance with the National Cooperative Highway Research Program (NCHRP) Report 534– Guidelines for Inspection and Strength Evaluation of Suspension Bridge Parallel Wire Cables. As the MacKay Bridge main cable is composed of 61 parallel strands with helicoidal wires, the NCHRP 534 approach (intended for parallel wires) was modified to perform the strength evaluation for cables with helicoidal wires. Based on the analysis performed, it was determined that the main cable of the MacKay Bridge has adequate capacity at this time. Additional measures to protect the cable, mainly through dehumidification, could be considered to prevent further deterioration of the main cable and extend the service life of the cable and therefore the bridge.

**Keywords:** Suspension Bridge, Cable, Strength Evaluation, Asset Management.

## 1 INTRODUCTION

Halifax Harbour Bridges (HHB) retained COWI North America (COWI) to perform a strength evaluation of the A. Murray MacKay Bridge (MacKay Bridge) main cable in accordance with the National Cooperative Highway Research Program Report 534 (NCHRP 534) – Guidelines for Inspection and Strength Evaluation of Suspension Bridge Parallel Wire Cables [1].

This study utilizes the findings of the inspection work on the main cable that HHB has conducted over the years (inspections by COWI, as well as other consultants). Data collected during the inspections was used to assess the physical condition and remaining strength of the main cables. The strength evaluation and condition assessment of the cables was also used to provide estimates of the remaining service life of the main cable and recommendations for future inspection, monitoring, investigations, corrosion protection and recommended maintenance.