ACCELERATED DECK REPLACEMENT FOR THE MACDONALD BRIDGE

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WSDOT ABC Workshop
Tumwater, WA
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Project Location

HALIFAX, NS
Bridge Location
Bridge Location

MacKay Bridge
DARTMOUTH
HALIFAX
Macdonald Bridge
Original Bridge

- Designed by P. L. Pratley
- Built by Dominion Bridge Company Ltd. in 1955.
- Suspension bridge: Main span 1,446 ft., L=2,498 ft.
- Operated by Halifax Harbour Bridges
Roadway Deck

- Deck OK for strength but high maintenance.
- Suspended structure replacement - Entirely new suspended structure including hangers in 2016.
Scope

- Replace suspended bridge superstructure including hangers
- Strengthen towers and bents if necessary
- Traffic to be kept running
- Superstructure replacement allowed only during closures – night / weekend closures
- Full segment replacement
Typical Deck Cross Sections

EXISTING

NEW
Fabrication
Fabrication
Fabrication
Fabrication
New Deck Segment

Photo from Lion's Gate Bridge Deck Replacement
Existing Elements

- Cables inspected in 2010
- Main cables in good shape, with sufficient capacity
- Tower and bents – very good
How?

• Traffic to be kept running
• 10 ½ hour full closures at night
• Approximately 7 full weekend closures
• Single-lane closures at off-peak times
Typical segment replacement

1

2
Typical segment replacement
Typical segment replacement

Photo from Lion’s Gate Bridge Deck Replacement
Typical segment replacement
Typical segment replacement
Typical Erection Gantry

TYPICAL ERECTION GANTRY – FRAMING PLAN

DEVICE TO MOVE STRAND JACKS (BY CONTRACTOR)
Typical Erection Gantry
Segment replacement in Halifax side span

- 16 deck segments to be in Halifax side span
- Over DND property
Turntable Erection Gantry
Halifax Side Span Segment Replacement
Halifax Side Span Segment Replacement
Increased Shipping Clearance

› Bridge deck jacked up following deck replacement
› Raising of deck 10 ft. at midspan; 1 ft. at towers
› Increase in shipping clearance 7 ft.
Erection Analysis

- Complex analysis; 700+ steps analyzed; iterative
Wind Engineering

› Halifax – hurricane zone
› High wind speeds -> significant wind loads
Wind Engineering – Aeroelastic Models
Wind Engineering – Aeroelastic Models
Main Cable Dehumidification
Main Cable Dehumidification

CABLE WRAPPING

DH PLANT

INJECTION COLLAR
When?

› RFP – December 2013
› Proposals received (ABC, FI, AV JV) - April 2014
› LNP, American Bridge Canada – June 2014
› Contract award – October 2014
› Erection start – expected August 2015
› Substantial completion – Sept/Oct 2016
Existing Bridge

New Bridge

Questions ?