

Design of Integral Abutment Bridges for a Lateral Slide Replacement

Matthew McFADDEN Douglas RABY

Bridge Engineer

Jacobs

Ottawa, Canada

Matthew.McFadden@Jacobs.com

Licensed professional engineer in Canada with experience in transportation engineering including bridge design, analysis, inspection, construction supervision and transit assignments.

Project Manager

Jacobs

Ottawa, Canada

Douglas.Raby@Jacobs.com

P.Eng. (ON) Canada Region – Bridge Solutions Lead with over 22 years’ experience in bridge design focused on highway and transit structures.

Konstantinos Kris MERMIGAS

Head, Bridge Design

Ontario Ministry of Transportation

St. Catharines, Canada

Kris.Mermigas@Ontario.ca

A creative and experienced engineer who inspires others to design sustainable bridges and pursue straightforward solutions to complex problems.

Brian UTIGARD

Design and Construction, Senior Project Engineer

Ontario Ministry of Transportation

Kingston, Canada

Brian.Utigard@Ontario.ca

Licensed by the Professional Engineers of Ontario with experience in transportation project management, bridge design and inspection, and contract administration.

Contact: Matthew.McFadden@Jacobs.com

1 Abstract

Jacobs is completing the preliminary and detailed design of two bridge replacements on County Road 17 in Ontario, Canada using an accelerated bridge construction technique known as lateral slide (also known as slide-in-bridge or jack-and-slide) for the Ontario Ministry of Transportation. The Hawkesbury Creek & CNR Overhead is a multi-span slab-on-girder structure spanning a creek and locomotive tracks. The Highway 34 Overpass is a single-span rigid frame structure spanning over the main road leading to the Town of Hawkesbury. The existing structures are approaching the end of their useful service life and rehabilitation is no longer a viable option. The new superstructures will be built on temporary supports located north of the existing structures. The new foundations consist of non-standard integral abutment details supported by composite caissons drilled through the existing roadway using temporary lane closures along County Road 17. This is an alternative to conventional integral abutment design which typically consists of a single row of steel H-piles. County Road 17 will be closed for up to four weeks to permit rapid demolition of the existing structures followed by the lateral slide. This is the first integral abutment lateral slide in the Province of Ontario. New design concepts, non-standard details and construction sequencing have been developed to achieve an economical, practical and robust design solution.

Keywords: accelerated bridge construction; lateral slide; jack-and-slide; slide-in-bridge; integral abutment; rapid demolition; rail crossing; structure monitoring.

2 Introduction

Jacobs is completing the preliminary and detailed design of two bridge replacements on County Road 17 (CR 17) in Ontario, Canada for the Ontario Ministry of Transportation (MTO). The existing structures are approaching the end of their useful service life (>60 years old) and rehabilitation is no longer a viable option. The replacement structures

will be designed according to the Canadian Highway Bridge Design Code (CHBDC) [1] for a 75-year life span. The main objectives of the project are to:

- Develop an economically viable solution to replace both bridges;
- Maintain the existing CR 17 roadway alignment;
- Minimize overall impacts to traffic, property and the environment;