39th IABSE Symposium – *Engineering the Future*
September 21-23 2017, Vancouver, Canada

The 102nd Avenue Bridge over Groat Road – Design Concept and Challenges

Matthias Andermatt, Gilbert Grondin, Bob Ramsay

AECOM Canada Ltd., Edmonton, AB, Canada

Katrin Habel

Associated Engineering, Vancouver, BC, Canada

Shiraz Kanji

City of Edmonton, Edmonton, AB, Canada

Contact: matthias.andermatt@aecom.com

Abstract

The new 102nd Avenue Bridge over Groat Road in Edmonton, Alberta, Canada is a 113 m long "character" bridge that spans over Groat Road which is located in a 22 m deep ravine. The bridge replaced a 104 year old bridge on steel trestles. The selection of the replacement bridge had to take into account several factors including marginally stable steep ravine slopes and traffic disruptions in the urban environment. An integral abutment bridge design concept was developed, consisting of an 83 m long main steel span connected to 15.6 m long integral concrete abutments supported on hybrid steel and concrete piles at the back and sliding bearings at the front of each abutment. This concept created several design challenges:

- Thermal movement range is considered to be at the upper limits for integral abutment bridges;
- Potential for uplift at the back of the abutments due to the abutments acting as short back-spans;
- Force continuity between the 83 m steel span and the abutments; and
- Construction sequence required to connect the concrete abutments to the steel span.

This paper presents the design concept and approaches, and construction methods for this structure.

Keywords: bridge, bearing, composite, hybrid, integral abutment, fatigue.

1 Introduction

The new 102nd Avenue over Groat Road Bridge has replaced the original bridge, which was built over the Groat Creek Ravine in 1910. The bridge had undergone several rehabilitations during its service life and overall was considered to be at the end of its life. Its capacity did not meet current code requirements and there were concerns about the condition of the timber pile foundations. The bridge was replaced by a wider bridge offering wider traffic lanes, bicycle lanes, and greater pedestrian access.

The objective of the design of the new bridge was to create a character bridge to span the 22 m high ravine over Groat Road, with a potential span of over 100 m. Bridge configurations ranging from single to three span options and girder bridges to arch structures were considered in the preliminary design taking into account the marginally stable

https://doi.org/10.2749/vancouver.2017.2763
Distributed by structurae