Design Challenges of the Horotiu Paa Bridge – Maximising Structural Efficiency and Economy

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Abstract

The Horotiu Paa Bridge, also known as the Karapiro Gully Bridge is the largest weathering steel bridge in New Zealand. Construction of the bridge was recently completed in November 2015. The bridge is part of the Cambridge section of the Waikato Expressway in New Zealand. The Waikato Expressway is one of the seven state highways, named the Roads of National Significance, identified by the government as essential to New Zealand's economic prosperity. The bridge spans over the Karapiro Gully with a total length of 200m, consisting of four 50m long equal spans and is 24m wide, servicing 4 lanes of traffic.

This paper discusses the design development, key design aspects, innovations and technical challenges for the design of the Horotiu Paa Bridge.

Keywords: Bridge Design, Steel, Weathering Steel, Seismic design, Structural systems, Analysis, Concrete, Innovative, Durability, Efficiency.

1 Introduction

The Horotiu Paa Bridge is a composite steel-concrete deck ladder bridge on the newly opened Cambridge Section of the Waikato Expressway located south east of Hamilton.

The project was constructed by HEB Construction with AECOM New Zealand as the lead design consultant, together with, Gaia Engineers, Bartley consultants and Traffic Design Group.

The project was procured by the New Zealand Transport Agency (NZTA) following the Design and Construct procurement model, with parties tendering to design and construct the $250 million dollar section of new state highway. The new section of road comprises 16km of 4 lane highway and bypasses the small township of Cambridge in the Waikato region of New Zealand. There are 8 bridges on the project with the majority of these being two span overpass and underpass structures to service interchanges and local roads. The Horotiu Paa Bridge is the largest bridge on the new 16km of highway constructed for this project.

The Horotiu Paa Bridge carries 4 lanes of traffic, and spans over the 45m deep Karapiro gully. Figure 1 below shows the final Horotiu Paa Bridge.

Figure 1. Horotiu Paa Bridge (Karapiro Gully Bridge)

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