

Structural Widening of 2-Span Continuous Prestressed Concrete Bridge: Structural and Seismic Implications

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Abstract

Widening of existing bridge structures to accommodate a capacity upgrade on roads each side are becoming more frequent for bridges that are still relatively young. Such widening must consider the interaction of new and existing structures during and after construction and the overall seismic performance and associated issues when an updated seismic code has to be applied. Here, the widening of the existing 208 Street Overpass across Highway #1 in Langley, British Columbia is presented explaining the evaluation and assessment techniques used to determine the constraints, design risks, seismic performance and the subsequent development of novel structural systems, innovative construction methods and advances in seismic design to complete the new structural design and seismic retrofit of the existing bridge.

Keywords: Superstructure widening; seismic retrofit; post-tensioning; shear walls; pile caps; strut-and-tie.

1 Introduction



Figure 1. Existing 208 Street Overpass

The existing 208 Street Overpass is in Langley, in the lower mainland of British Columbia and carries traffic on a North-South alignment over Highway 1. See Figure 1 above.

One lane of traffic is provided in each direction and pedestrians are accommodated by raised sidewalks on each side of the bridge but there is no dedicated cycle lane. A support pier located in the

median of Highway 1 supports the bridge superstructure creating a continuous 2-span arrangement.

The bridge is under the jurisdiction of the Township of Langley who have planned to widen the existing structure from two lanes to four since it was constructed in the late 1990's. This widening will provide much improved vehicular, bike and