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Design and Launching of a Redundant Truss over a Busy Rail Yard

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Abstract

Five deteriorating Warren trusses over the busy BNSF Northtown rail yard in Minneapolis need replacement. The new structure consists of a skewed 305-foot (92.96 m) truss and two-span steel girder structure to meet the RR's desire to eliminate two piers in their yard. The new truss incorporates unique load path and internal redundancy measures including eliminating fracture critical steel truss members and gusset plates and using a post-tensioned concrete bottom chord. Removal of the two existing truss spans over BNSF's main line tracks and the installation of the new truss span is accomplished using a launching system.

Keywords: truss; accelerated bridge construction; redundancy; launching; construction over rail roads; post-tensioning.

1 Introduction

The St. Anthony Parkway over Northtown Yard Bridge replacement project is located in Minneapolis, Minnesota. The existing bridge consists of five simple span Warren through trusses built in 1925 and crosses over 22 railroad tracks within the BNSF Northtown rail yard. It is owned by BNSF and maintained by the City of Minneapolis and carries both vehicular and non-vehicular pedestrian traffic. The steel truss span structures, shown in Figure 1, are both structurally and geometrically deficient containing fracture critical members, narrow travel lanes and substandard vertical clearances.

Figure 1. Existing Bridge

In 2013 Parsons was selected, as a subconsultant to SEH, by the City of Minneapolis to provide preliminary and final design services for replacement of the existing St. Anthony Parkway truss bridge. Parsons' final design of the main span of the new three span replacement structure consists of a 305-foot (92.96 m) redundant steel truss structure, shown in Figure 2, incorporating unique load path redundancy measures including eliminating fracture critical steel truss members and gusset plates and using a post tensioned concrete bottom chord. The approach spans designed by SEH consist of two-span continuous steel plate girders and all three spans incorporate a full-depth cast-in-place concrete deck with 54-foot (16.46 m) wide travel way. The deck is formed using stay-in-place metal decking in order to improve safety and minimize construction impacts to the rail yard below.

Figure 2. Proposed Bridge

Specialized construction methods for removal of the existing truss spans and installation of the new bridge were incorporated as part of the design. The design allows pairs of the new approach span

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