



2008 - 24th Street Bridge over I-29/I-80

Description

Meta Fields

Project Summary : Replacement bridge deck consists of full-depth precast deck panels pretensioned transversely and connected with longitudinal post-tensioning.

Project Location : on 24th Street over I-29/I-80 in the city of Council Bluffs

Mobility Impact Time :

- ABC: < 6 months, one construction season
- Conventional: 16 months, two construction seasons

Impact Category : Tier 6 (longer but reduced by months/years)

Dimensions : 353.5-ft-long and 105.67-ft wide two-span steel girder bridge (178.5 ft - 175.0 ft)

Average Daily Traffic At Time Of Construction : 15000

Traffic Management : staged over two construction seasons â?? same as ABC but twice as long

Existing Bridge Description : The existing four-span 215-ft by 60.8-ft four-lane continuous pretensioned concrete I-beam bridge was replaced as the first part of a multi-state (Iowa and Nebraska) effort to improve and upgrade the capacity of the Council Bluffs Interstate System.

Replacement Or New Bridge : Each replacement span consists of 12 steel welded plate girders that are 5-ft deep and spaced at 9 ft, and 8-inch-thick precast full-depth deck panels. The bridge has an 82-ft roadway width (two traffic lanes each direction plus two turn lanes), a 10-ft multi-use trail on one side, and an 8-ft sidewalk on the other side. The new vertical profile on 24th Street was raised about 5 ft to gain the necessary vertical clearance over I-29/80.

Construction Method : The bridge was constructed in two phases, maintaining at least one lane of traffic in each direction and a third lane to accommodate left turns. The existing bridge was partially removed to construct the first stage of the replacement bridge. The traffic was then switched to the new portion of the bridge to construct the remaining half. Traffic was maintained on I-29/80 except during placement of the bridge girders and deck panels directly over the interstate, when traffic was routed onto the 24th Street ramps. The 70 precast transversely pretensioned panels (52-ft long and 10-ft wide) were made with self-consolidating high-performance concrete to improve consolidation around the reinforcement and longitudinal post-tensioning ducts. The panels were cast offsite in a controlled environment and steam cured. The panels span about half the width of the bridge and accommodated the two phases of construction traffic. The panels were erected, shear studs installed, transverse keys grouted, longitudinally post-tensioned and ducts grouted. The shear stud pockets were then filled with self-consolidated concrete, and the 12-inch-wide longitudinal strip joining the two halves of the bridge deck was cast. A two-inch concrete overlay was then placed. Researchers had examined methods to splice the longitudinal post-tensioning ducts at transverse joint locations to keep moisture or grout from infiltrating the ducts. The result of the investigation indicated that sealing the post-tensioning duct connections with waterproof duct tape or a combination of waterproof duct tape and butyl rubber was adequate. An investigation of precast diamond plate texturing, chemical etching, and sandblasting surface treatments revealed that sandblasting delivered the highest bond for transverse joint shear transfer between panels. (See evaluation report under â??Other Related Information.â?) Fully-contained flooded backfill was used to minimize approach settlement and avoid the bump at the end of the bridge. A structural health monitoring system was installed to assess the deck panel and overall bridge performance during and after construction.

Stakeholder Feedback : Because of the size and scope of this project, at least two construction seasons would have been required to complete it using traditional methods. The decision for a maximum of one full construction season was made after consulting with local contractors. All contractors at the constructability review meeting held to discuss accelerated construction methods for the project were in favor of staged construction for one full construction season. To reduce the project delivery time and open all lanes of the new bridge within one construction season (April through October), the Iowa DOT selected the cost-plus-time (A+B) contract bidding process with a maximum of 210 days in the contract. The winning bid was 175 days. Up to 14 closure detours of I-80/I-29 were allowed, with liquidated damages of \$4,000 per hour if the specified time to open was not met. The I-80/I-29 closures were for short durations with on-site detour (ramps) during off-peak hours.

High Performance Material :

