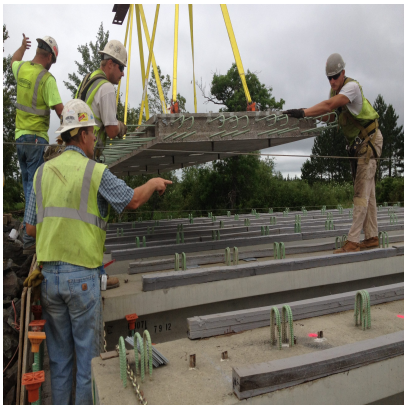

2012 â?? TH 53 Bridge over Paleface River

Description

Meta Fields

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Project Summary : full-depth, conventionally-reinforced precast concrete deck panels, post-tensioned longitudinally after erection
Project Location : State Highway 53 over Paleface River near the town of Cotton in northern Minnesota
Mobility Impact Time :

- ABC: 8-week closure
- Conventional: an additional two weeks

Impact Category : Tier 5 (within 3 months)
Dimensions : 75-ft-long and 45-ft-wide single-span prestressed concrete I-beam bridge
Average Daily Traffic At Time Of Construction : 4550
Traffic Management : extended use of cross-over and single-lane traffic
Existing Bridge Description : The existing bridge was a 51-ft-long, 35-ft-wide single-span cast-in-place concrete T-beam deck girder bridge with wall abutments on spread footings. It had two 12-ft-wide traffic lanes and two 3-ft-wide shoulders. Built in 1953, the superstructure and substructure were deteriorated and required replacement.
Replacement Or New Bridge : The replacement bridge has two 12-ft-wide traffic lanes, a 12-ft-wide outside shoulder, and a 4-ft-wide inside shoulder. The bridge has integral abutments supported on H-piling. The cross-section consists of eight 27-inch-deep 9,000 psi prestressed concrete I-beams spaced at 5.92 ft and topped with 9-inch-thick conventionally reinforced precast concrete deck panels that are post-tensioned longitudinally after erection.
Construction Method : The precast deck panels and prestressed beams were fabricated at a plant in the northern suburbs of Minneapolis/St. Paul (PCI certification was required). The deck panel details were similar to those used by the Utah DOT. To form the haunches the fabricator used a soft compressible material in lieu of polystyrene. The compressible material worked well. To complete the connection between the deck panels and the prestressed beams, the contractor was given the option of welding shear studs to the top of plates embedded in the girder top flange or using shear stirrups that extended out of the top of the beam. The contractor chose to use the extended stirrups, and it worked well with only minor interference on one beam line. The bridge cross-section included a crown near the centerline. Therefore, two panels and a field-cast longitudinal closure joint were used to complete the width. A total of 16 panels were placed, the last of which were installed in about 10-15 minutes each. After all of the panels were erected, joints grouted, and panels longitudinally post-tensioned and ducts grouted, the deck was longitudinally surfaced planed to provide a smooth riding surface. A thin polymer overlay will be placed over the deck surface in the spring of 2013. This was a demonstration project (MnDOTâ??s first use of full-depth deck panels), so the construction schedule allowed for potential changes and modifications. Crossovers were built on each side of the bridge and traffic was diverted to the adjoining roadway using a single-lane configuration for the duration of the project. The project included a disincentive of $1,500 per day for work continuing after August 21, 2012. The bridge was closed on June 22, 2012 and re-opened eight weeks later on August 16. A total of 28 actual onsite construction days were required.
Stakeholder Feedback : The design was completed by MnDOT staff. The PCI â??State-of-the-Art Report on Full-Depth Precast Concrete Bridge Deck Panelsâ?• was an excellent reference. Prior to starting construction and panel fabrication, two conference calls were held with contractors who had completed several deck panel projects in Utah. This proved to be very helpful for the contractor, particularly in regard to setting the panels and grouting the panel joints. The project went very well and proceeded fairly smoothly. The provisions required that a â??mock-upâ?• panel be constructed and grouted prior to construction in the field. This proved to be extremely helpful and will continue to be required until MnDOT has more fully adopted this construction method. A second full-depth precast deck panel project is planned for the summer of 2013, including re-decking an existing steel girder bridge.
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