2007 â?? Martin Branch Bridge

Description

Meta Fields

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Project Summary :

Bridge replacement with SPS deck on Modular Decked Beams

Project Location :

County Road 4191 over Martin Branch in Wise County northwest of the city of Fort Worth

Mobility Impact Time : The three superstructure spans were installed in less than three days, compared to approximately 3 months that would have been required for a conventional cast-in-place concrete deck. However, the bridge opening was delayed nine months; see â??Lessons Learned.â?•
Impact Category : Tier 6 (longer but reduced by months/years)
Dimensions : 150-ft long and 32.35-ft wide 3-span steel beam bridge (50 ft - 50 ft - 50 ft)
Average Daily Traffic At Time Of Construction : 270
Traffic Management : extended use of 0.25-mile detour, if constructed conventionally
Existing Bridge Description : The existing multi-span, one lane bridge was deteriorated and required replacement.
Replacement Or New Bridge : The replacement bridge has two 12-ft-wide traffic lanes and two 3-ft-wide shoulders. The cross-section consists of six W 27x114 (A709 Grade 50W) I-beams spaced at 6.27-ft with a 1.62-inch-thick proprietary Sandwich Plate System (SPS) deck. Each span consists of two 50-ft-long, 16.17-ft-wide SPS panels. Each panel consists of two outer 5/16-inch-thick steel plates sandwiching a bonded 1-inch-thick polymer core. The SPS deck self-weight is approximately one-third the weight of a conventional concrete deck. The conventional cast-in-place concrete substructure is founded on drilled shafts.
Construction Method : The superstructure segments were assembled in the fabrication plant. The beams were transversely connected with C15x50 steel diaphragms at each end and C15x33.9 steel diaphragms at mid-span. To achieve composite action, the undersides of the panels were continuously welded to the top flanges of the beams for one-half the bridge width of each span. At the bridge site the contractor detoured traffic and demolished the existing bridge. The concrete substructures were constructed conventionally. The six superstructure segments were hauled to the site. The two simply-supported superstructure segments in each span were erected onto elastomeric bearings and transversely connected with the C15x50 steel diaphragms at each end and the C15x33.9 steel diaphragms at mid-span. The 1-inch-wide transverse deck joints at the abutments and interior supports were cleaned and filled with silicone sealant. The two half-width panels were longitudinally connected at the centerline of the bridge utilizing 1-inch-diameter A325-SC bolts at 4-inch spacing. The bolts were pretensioned. The panels were then further connected with a 7/16-inch groove weld between the panels. The Texas T6 (Mod) traffic railing was bolted to the deck. A waterproofing membrane and thin polymer overlay was applied, and the bridge was opened to traffic.
Stakeholder Feedback : TxDOT used the SPS deck material strictly for its ability to install a deck system rapidly. The six sections of prefabricated deck/superstructure were installed in less than three days. In Texas, the SPS deck is better suited for bridges that would benefit from having a lightweight deck, such as moveable spans and very long spans. By comparison, a precast concrete deck or deck/girder system would have cost less in Texas, would not have required the thin polymer overlay, and would have been less susceptible to bearing slippage. In 2012, TxDOT made the following observations related to the deck material for this bridge: (1) The deck surface has depressions in it, attributed to weld shrinkage during fabrication, and these depressions hold rainwater until it evaporates. That said, the depressions are very shallow, in the 1/8 - to 1/4-inch range. The roadways in the local network were significantly less smooth than the new SPS deck. (2) At the time of construction no proposed overlay met TxDOTâ??s specifications, even though the specifications were largely driven by manufacturer's claims. An epoxy asphalt overlay was considered later on, but at that time the only contractor that appeared to have the equipment and ability to place epoxy asphalt was tied up overseas with several orthotropic deck/cable stayed bridge projects. Ultimately, TxDOT used the polymer overlay that came closest to meeting the specifications. It appears to still be working. (3) The

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