NSBA 2016 Prize Bridge Awards

THE COUNTRY'S BEST STEEL BRIDGES have been honored in this year's Prize Bridge Awards competition. Conducted every two years by the National Steel Bridge Alliance (NSBA), the program honors outstanding and innovative steel bridges constructed in the U.S. The awards are presented in several categories: major span, long span, medium span, short span, movable span, reconstructed, special purpose, accelerated bridge construction and sustainability. This year's 16 winners, divided into Prize and Merit winners, range from a mammoth marquee Mississippi River crossing to the country's first steel extradosed bridge. Winning bridge projects were selected based on innovation, aesthetics and design and engineering solutions, by a jury of five bridge professionals.

This year's competition included a variety of bridge structure types and construction methods. All structures were required to have opened to traffic between May 1, 2013 and September 30, 2015.

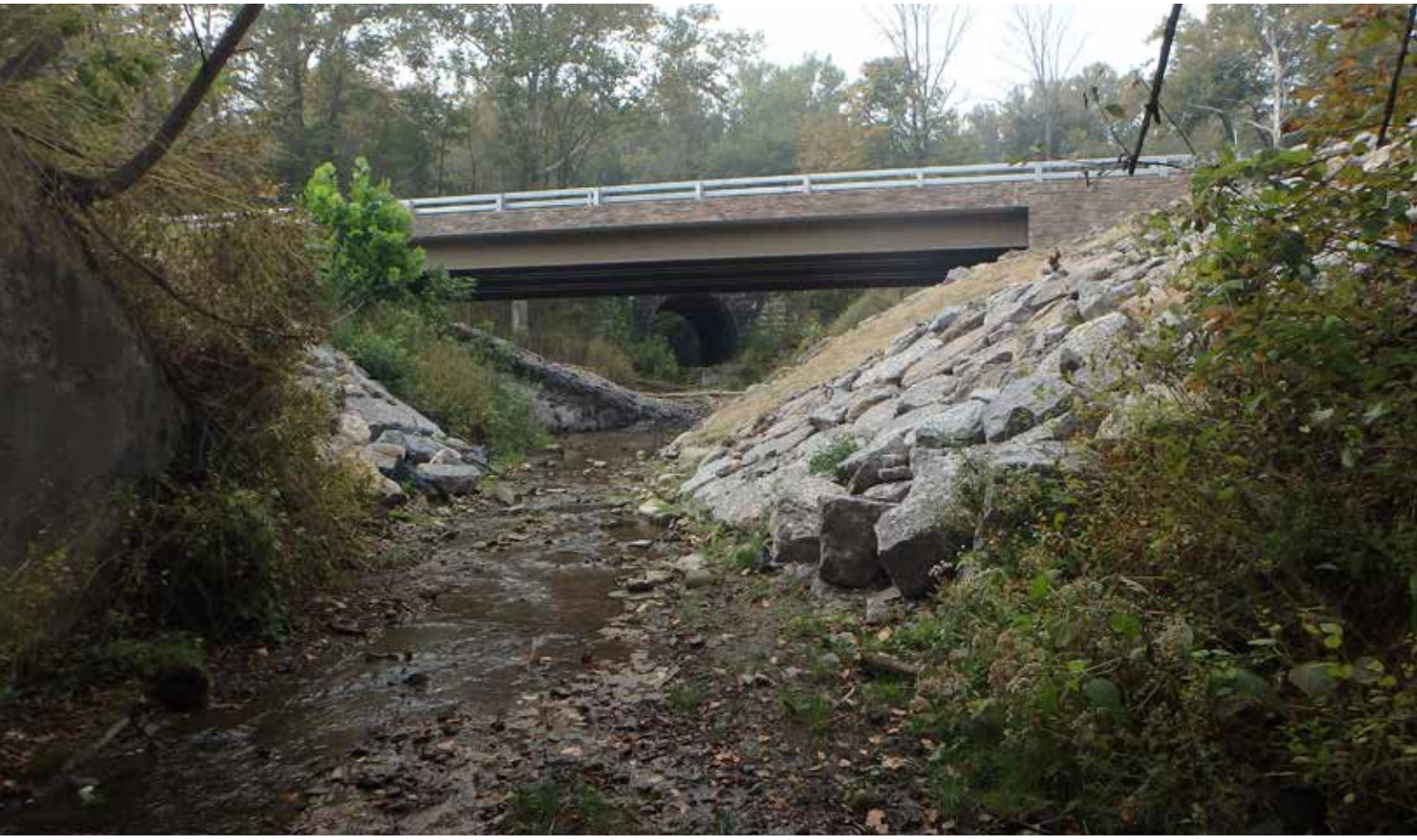
The competition originated in 1928, with the Sixth Street Bridge in Pittsburgh taking first place, and over the years more than 300 bridges have won in a variety of categories. Between 1928 and 1977, the Prize Bridge Competition was held annually, and since then has been held every other year, with the winners being announced at NSBA's World Steel Bridge Symposium. The following pages highlight this year's winners. Congratulations to all of the winning teams!

And check out past winners in the NSBA archives at www.steelbridges.org.

2016 Prize Bridge Awards Jury

- **David Spires**, P.E.
  Senior Engineering Manager with WSP Parsons Brinckerhoff
- **Michael Culmo**, P.E.
  Vice President of Transportation and Structures with CME Engineering
- **Brian Kozy**, P.E., Ph.D.
  Structural Engineering Division Team Leader with FHWA
- **Steve Jacobi**, P.E.
  State Bridge Engineer for the Oklahoma Department of Transportation
- **Carmen Swanwick**, S.E.
  Chief Structural Engineer for the Utah Department of Transportation

PRIZE BRIDGE: SHORT SPAN
ACCELERATED BRIDGE CONSTRUCTION COMMENDATION
Wampum Bridge, Lawrence County, Pa.



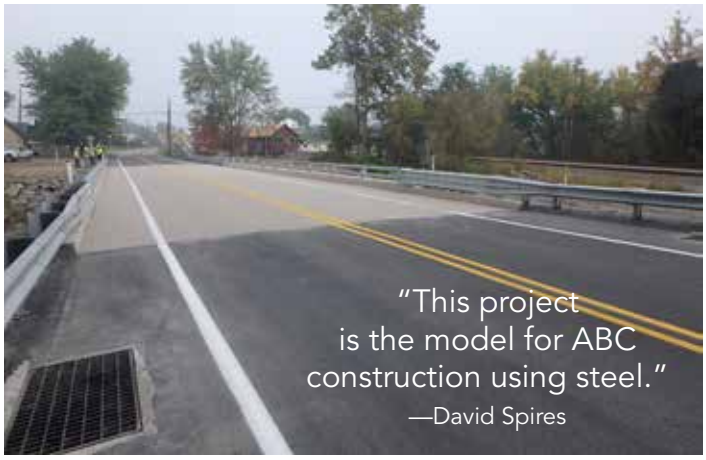
IN AN ALL-TOO FAMILIAR STORY, a bridge in Wampum Borough of Lawrence County, Pa., had fallen on hard times and wasn't going to get better.

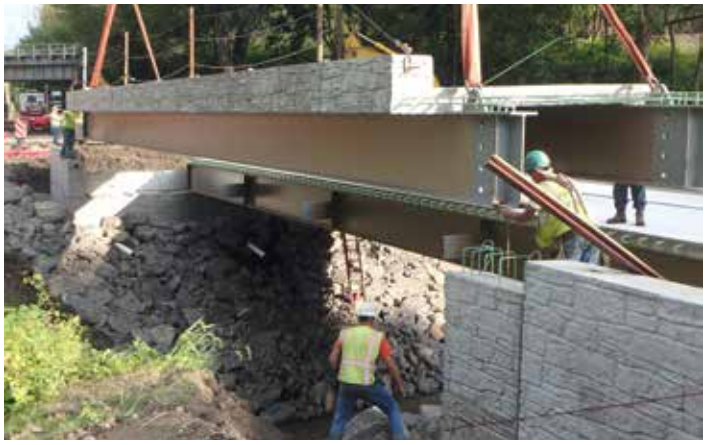
The severely deteriorated existing concrete arch carried SR 288/Main Street over Wampum Run and provided a vital connection for both residents and the local trucking industry. The failing structure had previously been reduced from two lanes to one bidirectional lane, and its weakening condition would have eventually warranted a full closure in the near future, thus requiring a 22-mile detour that was viewed as both costly and extremely inconvenient for local travelers. Either way, the bridge would need to be repaired or replaced.

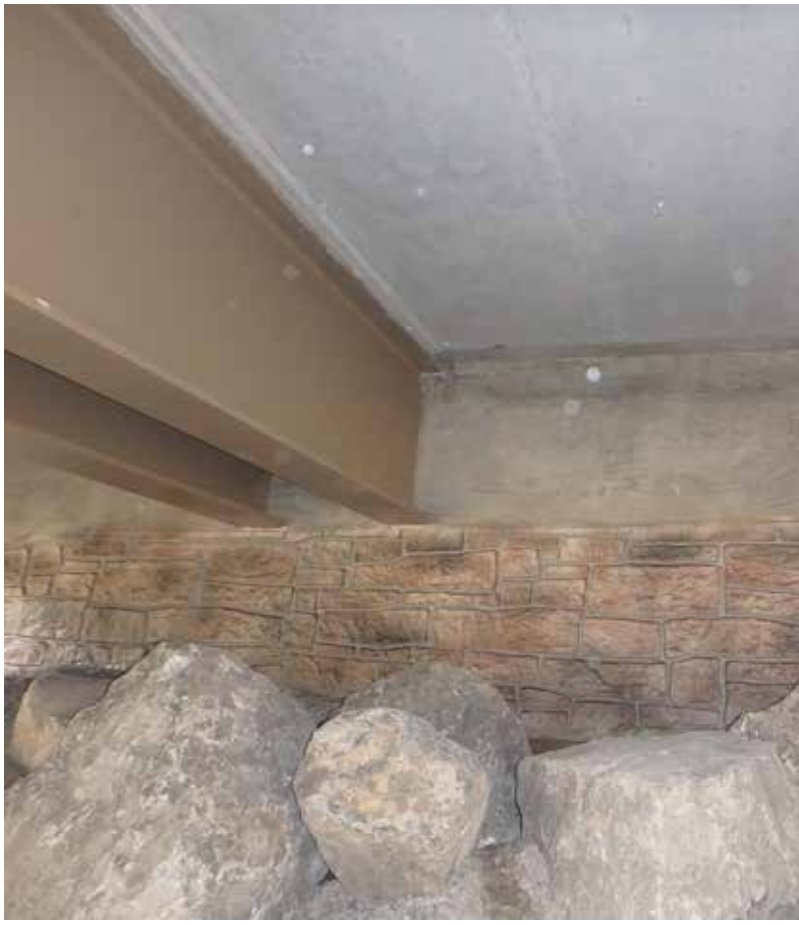
Conventional phased construction methods for maintenance of traffic were considered but would have required extensive and costly repairs to the arch, thus prompting both the Pennsylvania Department of Transportation (PennDOT) and designer Johnson, Mirmiran and Thompson (JMT) to take the replacement route. Project stakeholders wanted a reduced construction time frame and minimal inconvenience for travelers following the lengthy detour, and JMT and PennDOT agreed that this could be accomplished by using accelerated bridge construction (ABC) techniques.

Preliminary design began with research and discussions with engineering professionals from various states with bridges successfully built using ABC. JMT reviewed these other states' standards and special provisions, and discussed design and construction methods used on their successful ABC projects. As a result of this research, JMT presented a report concluding that a cost-effective structure could be completed in less than a month.

Various superstructure options were considered including multi-girder bridges with full-depth precast concrete decks, partial-depth precast concrete deck panels, adjacent butted beam superstructures, modular prefabricated superstructures and parallel beam superstructures with a conventional deck. PennDOT District 11-0's preference was to avoid post-tensioning and construct a joint-less structure using integral abutments. All stakeholders agreed that the best option was a 78-ft steel beam structure on integral abutments. The pile caps, wing walls, cheek walls, back walls, approach and sleeper slabs were designed to be precast units while the steel beams were to have the deck and barrier cast to them off-site using conventional methods to create three modular units. The initial construction schedule for this structure type was estimated to take 15 days to construct.







The geotechnical findings showed that the piles could be driven, but they would have to be re-struck after 48 hours. Due to the uncertainty of the foundation of the portions of existing arch structure that were left in place, predrilling was required to avoid striking the remnants of the arch during the pile driving operation. Adding predrilling and the waiting period of the re-strike affected the initial schedule, and several production activities were rescheduled to occur during the re-strike waiting period to maintain efficiency. The changes to the schedule increased the allowable timeframe to 17 days. Confident that the bridge could be open to traffic within this time frame, Road User Liquidated Damages (RULDs) were calculated and an incentive/disincentive of $36,000 per day was added to the construction contract.

Due to the accelerated design schedule, coordination with the railroads and limiting impacts to the adjacent railroad property were critical for the project's success. Both CSX and Norfolk Southern have property within the project limits, and the roadway tie-ins were designed to ensure the required right-of-way was minimal on the CSX property and was not necessary on the Norfolk Southern property. Additionally, through coordination with CSX, the necessity for flaggers was eliminated by providing construction fence to prevent the contractor from accessing railroad property.

Another challenge was coordinating the relocation of Columbia Gas Transmission's line in a narrow time window. The existing gas transmission line crossed the roadway less than 15 ft behind the existing abutment, and because the gas line was so close to the structure and the project used integral abutments, it was impossible to avoid impacting the line. It had to be relocated prior to construction and the design had to be expedited in comparison to a typical project due to the condensed design schedule. Through extensive coordination between JMT and Columbia, a relocation route was developed, avoiding the proposed abutments, drainage structures and guiderail posts as well as roadway excavation. The roadway was closed for seven days, the new bridge was constructed in 7 days and the overall project was open to traffic on August 24, 2014, well ahead of the September 21, 2014 milestone date.

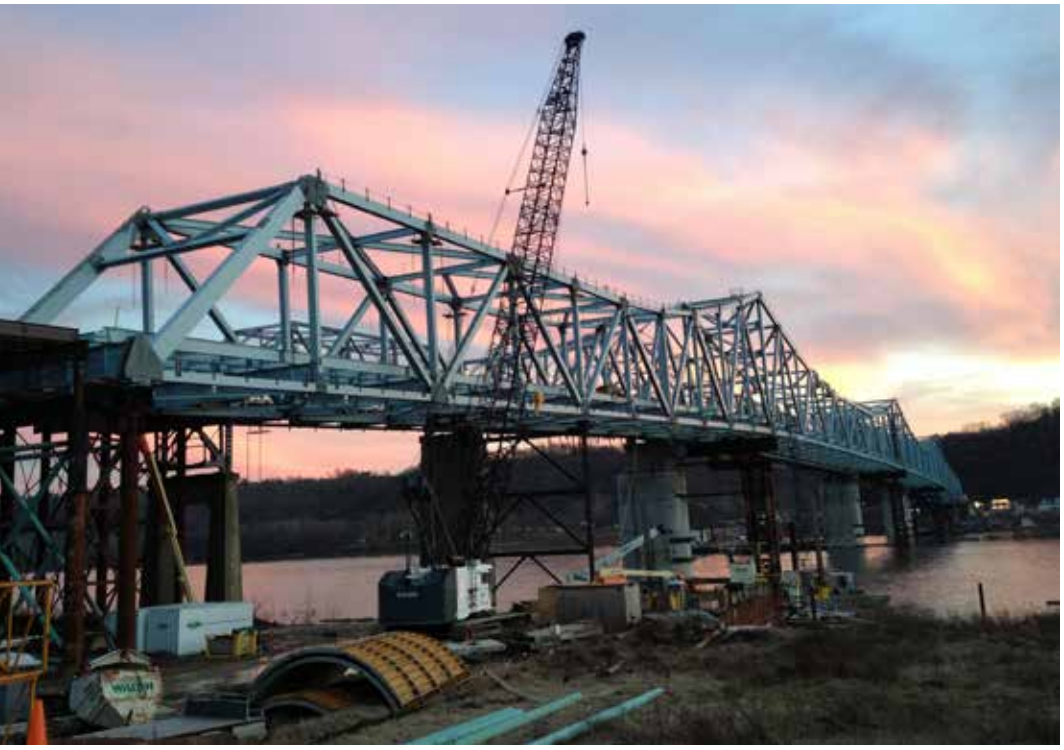
Owner
Pennsylvania Department of Transportation, Bridgeville

Designer
Johnson, Mirmiran and Thompson, Inc.,
Moon Township, Pa.

Contractor
Joseph B. Fay Company, Tarentum, Pa.

ACCELERATED BRIDGE CONSTRUCTION COMMENDATION

Milton-Madison Bridge, Milton, Ky./Madison, Ind.



SINCE ITS COMPLETION IN 1929, when America was on the brink of the Great Depression, the original US-421/Milton-Madison Bridge served as a vital link over the Ohio River between Milton, Ky., and Madison, Ind.

A structure that was designed for the occasional Model-A Ford had seen its burden grow to more than 10,000 modern vehicles per day, including semitrailer trucks loaded at full capacity. Although it was historically significant, the aging bridge had become functionally obsolete. A TIGER discretionary grant from the U.S. government became the catalyst to one of the most innovative bridge replacement project endeavors in the nation.

Using the accelerated bridge construction (ABC) method, the project began with the construction of temporary approach ramps, allowing traffic to be rerouted off of the existing approach spans to begin their unobstructed demolition and replacement. While these phasing activities were occurring, sections of the 7,200-ton truss superstructure were being preassembled on barges for the eventual float-in and strand lifting onto temporary piers, which were constructed adjacent to each existing pier stem. The temporary piers were designed to support live traffic on the completed bridge in its temporary alignment, freeing the existing structure for explosive demolition and pier cap widening. The temporary pier caps featured a key design element—the "sliding girders"—which would serve as the pathway for the record-breaking truss slide. The nearly ½-mile long completed bridge, weighing more than 16,000 tons at the time of the slide, was moved 55 ft laterally into place atop the refurbished and widened pier stems of the existing bridge. ■

For more on this project, see "Move that Bridge!" in the February 2012 issue and the item "Biggest-Ever Bridge Slide" in the News section of the August 2014 issue, both available at ***www.modernsteel.com****.*

Owner
Indiana Department of Transportation, Indianapolis
Kentucky Transportation Cabinet, Louisville

Designer
Buckland and Taylor, Ltd., North Vancouver, B.C., Canada

Contractor
Walsh Construction, Chicago

Steel Fabricator
High Industries, Lancaster, Pa.