Figure 3 –
Pier 3 Caissons Facing Downstream. (Photo Courtesy of FINLEY Engineering Group, Inc.)

Ironton—Russell Bridge between Parkersburg, Kentucky and Cincinnati, Ohio

Casting back spans on falsework and precast stay anchor blocks allow land-based access and save costs to move project forward.

Deciding to go against the norm and build the back spans using falsework for the Ironton-Russell replacement bridge **(Figs. 3, 4, 5 and 6)** didn't come easy. But that bold decision, which permitted land access to build the main span, along with the first use in the USA of precast stay anchor blocks are what it took to get this long-awaited project built.

Brayman Construction Corporation's bid, utilizing a combination of **Brayman** and **FINLEY Engineering Group's** design and construction method changes, was 4% below the state's final estimate of $84.6 million. When Rich Blankenship became the mayor of the city of Ironton, he made it a priority to get this critical infrastructure project under way by working diligently with the Ohio Department of Transportation (ODOT) and former Governor Ted Strickland and now Ohio Governor John R. Kasich. "We've been working on this bridge for years, and it has finally becoming a realty. The innovative design changes sped up construction and reduced the overall cost of the project," Blankenship said.

Opened in 1922, the original Ironton-Russell Bridge was the first highway bridge along the Ohio River between Parkersburg and Cincinnati. The cantilever bridge was retrofitted in 1970s, and later posted with restrictions, having become inefficient for today's traffic and economically impractical to maintain. In 2000, ODOT recommended full replacement.

URS was selected in January 2006 to redesign the replacement bridge after ODOT rejected the bids of the initial single-tower, two-span cable stayed design, which came in well over construction estimates. The new cable-stayed replacement bridge is a three-span, two-tower design with two 12-foot travel lanes.

The 2,616-ft-long bridge is comprised of a 900-ft cable-stayed main span and two 370-ft cable-stayed side spans, two 315-foot tall towers and two anchor piers on the rivers edge. The entire structure is cast-in-place with 22,500 cy of reinforced (5.8 million lbs. of rebar) concrete, utilizing the cable stays to construct the bridge by the balanced cantilever methodology. Foundation units consist of 53 large-diameter drilled shafts ranging in size from 42 to 96 inches.

ODOT asked **URS** to oversee the revised portions of the design and construction that the **Brayman-FINLEY** team proposed. "The changes uphold the integrity of the original design, and, since some members were designed to support heavy construction equipment, the bridge has more robust side spans," said Steve Stroh, Ph.D., P.E., URS' Project Manager.

EARLY TEAM EFFORT IN PRE-BID PHASE

"Our early collaboration with **FINLEY** and **VSL** enabled us to work out alternative construction sequence solutions that ultimately saved ODOT $15.2 million over the next closest bidder," stated Stephen M. Muck, Brayman's CEO.

Craig Finley, Jr., PE, managing Principal of FINLEY, explained, "There are several key modifications to the means and methods and design, most notably the first known use in the USA of precast stay anchor blocks and the casting of the back spans in place using specially designed falsework."

This, along with precast concrete girders for floor beams on side spans, allowed Brayman to have land access to build the main span area. This saved costs and time, as well as presented a much safer work environment.

"The falsework was designed as a modular system, allowing it to be used for both the Kentucky and Ohio approaches and reducing the number travelers from two to one," continued Finley. "The use of precast stay anchor blocks allowed Brayman to immediately install the cable

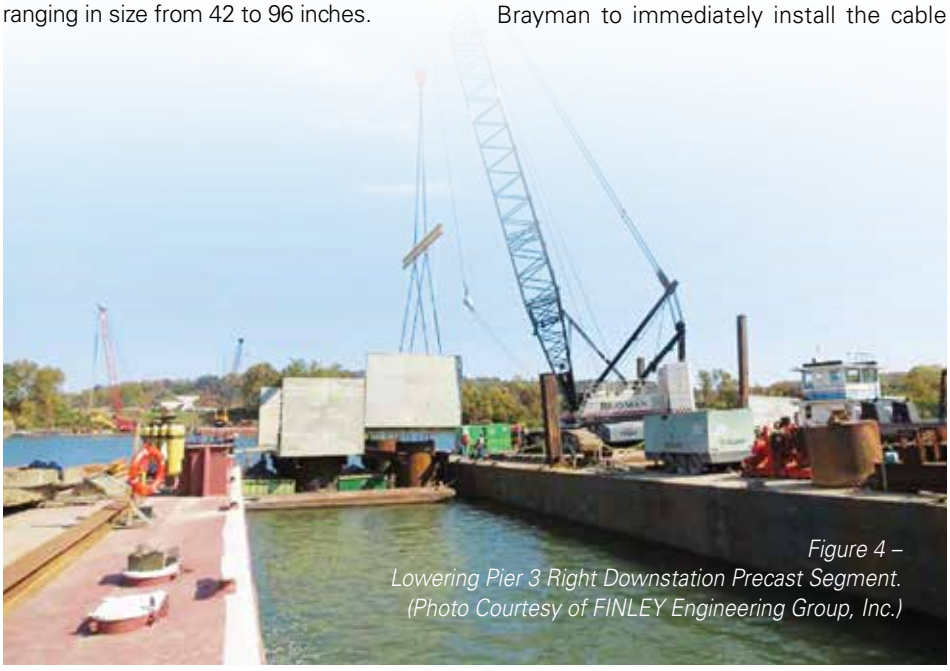

Figure 4 –
Lowering Pier 3 Right Downstation Precast Segment. (Photo Courtesy of FINLEY Engineering Group, Inc.)

stay and simplified the traveler design, reducing the pouring cycle by a week."

Brayman decided to use precast concrete cofferdams rather than the typical sheet pile style to speed up the construction process and save on costs. "The use of precast cofferdams allowed us to greatly reduce the amount of tremie concrete required, as well as provide a sacrificial form for the tower footing," explained Muck.

While the original design specified the use of two form travelers, the modifications allow the main span to be cast in place in a segmental, one-directional cantilever method. The specially designed traveler is currently being produced by VSL, which also is providing 209,000 lf of post-tensioning strand and 12,200 lf of post-tensioning bar. VSL is furnishing and installing the VSL Stay Cable System, which includes the anchorages, strand, stay pipe and dampers. "Integrating the traveler design and fabrication along with the stay supply and installation will ensure successful completion of the main span," said John Crigler, President of VSL.

"**Brayman, VSL** and **FINLEY** were able to capitalize on the strong relationship, trust, and experience that we gained in working together on the $83 million I-64 crossing of the Kanawha River in West Virginia," said Finley.

PROJECT STATUS UPDATE

As of the beginning of February 2013, "The project is about 20 percent complete," reported Tom M. Hesmond, P.E., Brayman Construction's on-site project manager. "All foundation elements have been driven or cast and the piers are coming up on the Ironton side. We're on target to complete the project in 2015."

From ODOT's perspective, David Bame, PE, Project Engineer, said "We took a close look at the changes proposed by the contractor to ensure that the bid met our requirements. The changes were very innovative, kept to our high standards, and resulted in less cost to our taxpayers. Preliminary approval was provided in 2 months, with final approvals complete in 6 months. After years of hard work, patience and diligence, the residents of Ironton and Russell and other travelers will soon enjoy a reliable, safe crossing to enhance commerce and quality of life in the area."

Figure 5 –
Pier 3 Precast Segments. (Photo Courtesy of FINLEY Engineering Group, Inc.)

Owner: Ohio Department of Transportation
Contractor: **Brayman Construction Corporation**
Construction Engineering Services: **FINLEY Engineering Group, Inc.**
Precast Producer: Car Concrete/**Brayman Precast**
Form Travelers for Cast-in-Place Segments: **VSL**
Post-Tensioning Materials: **VSL**
Stay Cable Materials: **VSL**
Bearings: **The D.S. Brown Company**
Expansion Joints: **Watson Bowman**

Figure 6 –
Standing on Dike in Ohio Facing Upstation. (Photo Courtesy of FINLEY Engineering Group, Inc.)