Since the 1960s, the City of Louisville has discussed the need for more cross-river mobility over the Ohio River. Early after its construction, it became clear the John F. Kennedy Memorial Bridge, built in 1963, was inadequate for the mobility needed to grow the “Kentuckiana Region,” a metropolitan statistical area of more than one million people. Ironically, after years of debate, a major 1993 study, multiple lawsuits, and numerous fits and starts; the project moved forward in the depths of the Great Recession.

Today, rising out of the wide Ohio River, is a 2,100 foot cable-stayed-bridge, the I-65 Abraham Lincoln Bridge. The John F. Kennedy truss Bridge remains in place, right beside the Lincoln. The new I-65 bridge connects Louisville, KY with Jeffersonville, IN. The main span is 71 feet above the Ohio River, with the central tower extending 195 feet above the deck. The Kennedy Bridge will carry the southbound I-65 lanes, and the new Lincoln Bridge will carry the northbound lanes.

Amazingly during the dark days of decreased infrastructure spending, the I-65 Abraham Lincoln Bridge was a bright spot not just for economic development, but also for innovative concrete technology. Construction began in early 2013 with over 50,000 cubic yards of ready mix concrete placed with great care into the bridge. The concrete industry shone but there were challenges.

On a morning when the temperature reached 10°F Fahrenheit, concrete was batched to be put into piers in the middle of the Ohio River. It seemed when Advance Ready Mix wasn’t in the cold they were adding ice to the mix.

“In the summer we would use +/-110 lbs/yd bagged ice in the mix,” said Advance Ready Mix Technical Director Roger Laslie.

Cooling tubes were used in the summer to control temperature gain during initial cure. Cool water was constantly circulated through the structure. The tubes were grout filled upon completion.

“This was the most challenging project I or the company had ever worked on,” Laslie said with a smile. “In Kentucky we don’t ordinarily batch concrete 15 or 20°F below freezing.”

Extreme cold caused Walsh Construction to build a cover for the structure to artificially maintain curing temperatures in the winter.

Kentucky ready mix producers do not often pour much concrete 100 feet below water in the middle of the Ohio River. Getting the concrete to the actual point of placement, in the middle of the river, was a challenge. Some pours required two pumps, one on land and one on a barge in the river. The pumps were hooked together with a slick-line. Walsh Construction used two barges containing four 4-yard buckets. Two Advance Ready Mix mixers would fill all four buckets up simultaneously, so the barge could transport the concrete to the tower crane for placement. Walsh Construction used this method to pour +/-60 cubic yards per hour.
Of the challenging mixes Advance Ready Mix with Lehigh Cement made, three types stand out:

- The underwater piers required 45% Type F fly ash. The underwater piers were poured into 12 foot diameter steel casings. As the 10-inch slump concrete flowed in, the displaced river water flowed out the top of the casings.

- The piers above the waterline but below the deck were solid core piers. These mass concrete pours, besides having the cooling tubes mentioned, required sensors and monitoring to prevent thermal cracking.

- The precast panels placed on the bridge deck required infill between the large panels after placement. This was an 8000 psi mix with 5% silicafume.

In addition to the main span, there were some 40 plus smaller “bridges” within a mile radius of the main span, in an area where I-65, I-71 and I-64 come together and is often called “Spaghetti Junction.” These bridges were surfaced with a special mix that is high with corrosion inhibitors.

In December 2015, the Abraham Lincoln Bridge was opened to two-way traffic. The Kennedy Bridge will reopen with a new deck in the fall of 2016.

As always, the concrete industry is a vital part of the rebuilding of America’s infrastructure. The Abraham Lincoln Bridge is an outstanding example of the importance and versatility of concrete and cement materials in the transportation facilities of the country. It takes industry professionals willing to accept the challenges, to build great projects.

“All of our employees know that we are helping to build a piece of history in Louisville, and there is a lot to be proud of when you watch the progression of this massive bridge across the river and know that you played a vital part in creating it,” said President of Advance Ready Mix Camilla Schroeder. “Our industry is unique as it gives us the ability to shape the skyline of our city well beyond the time we are part of it. The Abraham Lincoln Bridge is something that we will proudly share with many generations that follow.”

By:
Greg Smith
Pavement Technology Director
Kentucky Concrete Pavement Association