Conquering the Greats
After it helped battle the Depression, Missouri span takes on Recession

The last time this stretch of Missouri Highway 17 saw a new bridge crossing the Osage River in Miller County, Herbert Hoover was president.

It was during the Great Depression that the 20-ft-wide through-truss bridge was completed, enabling farm equipment, military vehicles and occasional motorists to cross the Osage River near Tuscumbia, Mo.

While the Missouri Department of Transportation (MoDOT) targets a 50-year life for its bridges, this 78-year-old bridge has bested that mark by more than 50%, and it was showing its age.

“The bridge deck was rated as a Condition 3 and the substructure a Condition 4 with some permanent false work in place,” commented Roger Schwartze, district engineer, central district for MoDOT. Like many U.S. bridges, it is structurally deficient and functionally obsolete.

The rickety bridge definitely showed signs of being from a different era. The bridge’s deck is narrower than the roads feeding into it. Load limits are established, and large trucks may pass the bridge at only 15 mph. Even with these limitations, it remains a vital link for the 3,300 vehicles per day crossing the deck, as the next closest bridge is nearly 20 miles away.

Recovering just fine
Nearly 80 years after the current bridge was built, today’s economic conditions during construction of a new Osage River Bridge are eerily similar. A global economic meltdown has resulted in receding economic output and rising unemployment. With the incredible loss of jobs and wealth, some call this the Great Recession.

It seems apropos that a project to replace the bridge built during the Great Depression...
was the first to receive funding under the American Recovery and Reinvestment Act. As soon as the bill was signed into law in February 2009, a check was handed over to the bridge contractor, APAC-Kansas Inc., Kansas City, Kan.

Although just $8.5 million, this project is a prime example of ARRA’s intent. The design work was in process for replacing the outdated Osage River Bridge, “but project funding wasn’t anticipated for at least two years,” said Schwartze.

Timing couldn’t have been better for the recession-ravaged area. Miller County had recently experienced two plant closings, and unemployment was higher than the state average. With APAC-Kansas being more of a local contractor, the company was feeling the effects of the economic slowdown and had laid off some workers.

The stimulus program and Osage River Bridge project helped employment. “The stimulus was welcome,” mentioned Rick Zimmerman, area manager, APAC-Kansas, Kansas City Bridge Division. “By starting when it did, this project meant no gap between jobs, so we were able to retain and call back some workers.”

The project also reaped some economic ripple effects. From the grading contractor to material producers to steel fabricators, the new Osage River Bridge is helping to keep workers on the payroll. Through new equipment purchases, like the Terex Bid-Well 4800 paver bought for paving the bridge deck, the project also is helping related equipment manufacturers.

Kevin Helton, owner of Helton Sand & Gravel Inc. of Eldon, Mo., the grading and excavation contractor, mentioned that business within the area had slowed over the last couple of years, but the project is helping. “We were able to pull some people from unemployment,” he said.

MoDOT is making the most of the state stimulus program’s $525 million available for road and bridge projects. While some criticize the slow progress of the program, Schwartze reported that MoDOT is right on schedule for letting the money.

“As of the end of October, we have obligated $381.5 million, or 71% of our funds. Nearly 120 projects have been awarded across the state, with 64 of those projects now completed.”

Caught in a bluff

MoDOT is maximizing the use of funds on this project by taking advantage of flood-control measures upstream. When the current bridge was built, only the Bagnell Dam was in place. Today, the Truman Dam also is upstream, which allowed MoDOT to select a location that shortened the bridge by more than 100 ft.

“The current bridge is 1,083 ft long, but the one replacing it will be only 969 ft,” explained Schwartze. “This allowed us to cut bridge cost by nearly $500,000.”

The superstructure for the modern bridge is a combination of concrete and structural steel girders. Four precast concrete girders—two at 87.5 ft and two at 111 ft long—were used for the land-based spans, while the longer water spans are supported by two 175-ft and one 220-ft steel girders. Two abutment, four land and two water piers support the bridge’s substructure.

While the new bridge location may have saved MoDOT money, it posed construction challenges. Being downstream from the two dams caused significant fluctuations in water levels while drilling the piers.

“Water depth would change up to 10 ft in a day,” said Zimmerman.

To navigate the steep bluff at the south end of the bridge, a new haul road was built on private property about a half-mile up the highway from the water.

“For the girders, we had to use steerable trailers to cross the bluff and maneuver around the tight jobsite,” said David Cockrum, general superintendent, APAC-Kansas.

Then there is the close proximity to the existing bridge, which remains open until its replacement is finished: “Since the old bridge is 30 ft from the new, we can only access the site from one side, and we had only about 2 ft of extra room when placing the girders,” added Cockrum. After the project is completed, the original bridge will have to be carefully demolished.

All decked out

Deck paving of the northern approach began in mid-September. A 5% incline running north to south posed a challenge.
“We were initially concerned about the paver making the grade and getting the concrete to hold in place,” explained Keith Miller, project superintendent for APAC-Kansas.

The new deck is 8 ft wider than the one it replaces, featuring two 11-ft-wide traffic lanes with 3-ft-wide shoulders. The design specs called for 3,308 sq yd of a Missouri B2 concrete mix rated at 4,000 psi for the deck. In order for the concrete to remain in place for the paver, it was pumped at about a 4-in. slump, a little dryer than APAC-Kansas likes.

Providing another ripple effect to the stimulus program, APAC-Kansas purchased a new Terex Bid-Well 4800 paver for deck paving. Capable of adjusting from 36 to 172 ft wide, this class of paver was selected so the base frame could tackle the 28-ft-wide paving width without adding truss work to the frame. “We wanted a machine that would do most of the work for us and leave little hand work,” mentioned Cockrum.

No options were added to the machine to compensate for the incline. Crews set the frame to a 32-ft width and paving carriage to 28 ft. Although the grade was of initial concern, “the weight of the paver allowed the bogies to walk right up the hill,” stated Cockrum. Crews advanced the machine in about 6-in. increments in order to get a uniform finished surface in as few passes of the paving carriage as possible.

To aid in finishing the concrete surface, crews leveled the two 5-ft-long paving rollers, adjusted the patented Rota-Vibe system at grade and set the dual drag pans at 0.125 in. above the concrete surface. As required by MoDOT, APAC-Kansas equipped the paver with a fogging system.

Cockrum admitted that it is a struggle to find a system that emits a true fog without water pooling, which can lead to a scaling issue. The company has made its own fogging system in the past. However, the new fogging system is working well for them. “We like this new system and the ability to adjust the fog spray,” said Cockrum. “We’ve also ordered some nozzles for our own systems.”

The north approach deck’s 150 yd of concrete was paved in September. In November, crews poured another 220 yd for the southern approach. That pour began in mid-air, as crews paved from the river’s edge toward land in order to continue moving uphill. They were scheduled to pour the slab-on-steel deck spans over the water in 2010 as the contract draws to a close in October 2010.

While this stimulus project worked well for APAC-Kansas, Zimmerman cannot help but look to the future and how critical passing a multiyear highway bill is to the industry.

“The stimulus was welcome but only a short-term fix,” he said. “Long-term funding is the key to sustainability. Without it, the project owners cannot plan.”

Zettler is president and founder of ZComm, Cedar Rapids, Iowa.