

# New-to-Missouri Construction Technique Shortens closure of bridge near Lebanon

from MoDOT

SPRINGFIELD — The westbound lanes of Interstate 44 at the Gasconade River east of Lebanon were opened to traffic Tuesday morning after being closed for only 20 days instead of 60 days because of a new-to-Missouri "bridge jacking" construction technique. One westbound lane was opened on Monday, May 23.

A new 670-foot long bridge deck with underlying girders attached — weighing 2,000 tons — was built next to the existing bridge. Hydraulic jacks were used to slide the new superstructure into place in one piece during a 10-hour operation on one day.

The process, employed elsewhere in the United States and in other countries, will be used again in Missouri later this year — in a project to rehabilitate a Route 5 bridge over the Lake of the Ozarks at Hurricane Deck north of Camden.

On May 5, the I-44 westbound lanes at the Gasconade River bridge were closed and westbound traffic was shifted to the eastbound side. That meant only one lane of traffic was open in each direction along a half-mile long stretch. Traffic was slowed.

However, by using this innovative method of bridge construction — building the superstructure on temporary columns and "sliding" the new deck-and-girder assembly onto the existing bridge's columns — only 20 days of "head-to-head" traffic were needed. Traditional reconstruction methods would have kept the westbound lanes closed for at least 60 days.

Shortening the time needed for such a traffic constriction reduced disruption and improved safety on busy I-44.

The I-44 westbound bridge over the Gasconade River was

built in 1955. Its deck had deteriorated considerably and, in recent years, needed frequent repairs. The repair work often required day and night lane closings.

## Heavy Lifting

To tackle the bridge rehabilitation project and be in a position to earn incentive pay to complete the job and open the bridge ahead of schedule, construction contractor Emery Sapp and Sons of Columbia recruited Parsons Engineering of Denver, CO, to design a temporary substructure on which to build the new bridge deck and girders and to plan the move of the new superstructure onto the existing columns.

Emery Sapp brought in another subcontractor to do the actual "bridge jacking" work. The company is Mammoet, a privately-held Dutch company specializing in the hoisting and transporting of heavy objects. (Mammoet is Dutch for mammoth.) The Mammoet crew came out of Houston, TX.

To put the problem of moving a 2,000-ton mass into perspective:

■ The Lebanon Fire Department's Ladder No. 1, its largest piece of firefighting equipment, weighs 40 tons. The bridge's new superstructure is equal to 50 Ladder No. 1s.

In the end, using the "bridge jacking" technique, Emery Sapp earned an extra \$600,000 in incentives by completing the project and getting the westbound lanes open quickly (\$40,000 a day, capped at 15 days). Emery Sapp also earned an extra \$600,000 in incentives for early completion of the resurfacing of a nine-mile section of westbound I-44 at St. Robert. Total cost of the project at St. Robert and the Gasconade River came to \$12.2 million.

## On the Net

For time lapse photography of construction of new superstructure and sliding into place on existing bridge, go to [http://www.youtube.com/user/MoDOTSpringfield?blend=6&ob=5#p/a/u/0/Y0qERuNX\\_mA](http://www.youtube.com/user/MoDOTSpringfield?blend=6&ob=5#p/a/u/0/Y0qERuNX_mA)

Here's an abbreviated description of the bridge rehabilitation and "bridge jacking" process:

■ In mid-February, construction began on temporary bridge columns on the north side of the westbound bridge. Four new girders, with longest span length of 150 feet were placed on the caps of the columns. The bridge, with several spans, is 670 feet long. Concrete for the new deck was poured April 20. Barrier walls were poured April 28-29.

■ On May 5, westbound I-44 traffic was shifted to the eastbound side. The old bridge deck and girders were removed by May 13. Then substructure repairs were made to the old bridge.

■ Concrete extensions 8-1/2 feet long were added to the columns on the existing bridge to close the gap between the existing bridge and the temporary columns where the new 38-foot wide deck-and-girder assembly was built. That left only a 3/4-inch gap between the two structures.

■ "Sliders" were placed continuously across both sets of bridge columns. Sliders are stainless steel plates 2 feet wide and 10 feet long. Sliders were placed on top of the temporary bridge columns underneath the new girders and deck as they were built. Teflon bearing pads were attached to the bottom of the new girders to further ease the movement. Sliders

also were placed on top of the columns of the existing bridge and across the 3/4-inch gap between the two bridges.

■ Seven hydraulic, "push-pull" jacks, powered by diesel generators, were set up, one jack on each of the new columns. The jacks "pushed" the new superstructure and then "pulled" themselves up to make next push.

■ On May 16, the new deck-and-girder assembly was slowly moved 45 feet — from the temporary columns onto the columns of the existing bridge. The process began at 9 a.m. The move was completed at 7 p.m. The day included a four-hour delay to readjust sliders and make other corrections. During the sliding process, the new structure was moved 3 feet at a time because of the 3-foot stroke of the hydraulic jacks. Each 3-foot move took about one minute.

The move was made successfully with no damage to the new deck-and-girder structure as it was shifted into its permanent location on the columns of the existing bridge.

■ Dishwashing liquid was used as a lubricant to help ease the new deck-and-girder structure along the sliders. Workers, who bought 30 "economy size" jugs of dishwashing liquid at stores in Lebanon and St. Robert, liberally applied the liquid to the sliders as the jacks pushed.

■ Starting May 16, leading up to the bridge opening, workers replaced the teflon bearing pads with permanent weight bearing plates, laid asphalt on the highway approaches on each side of the bridge, installed new guardrail and cut in and painted rumble stripes.