

Phase 1 Down, 2 to Go on Iowa Hwy. 100 Extension

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New construction of an extension onto Iowa Highway 100 in northern Cedar Rapids began in early June 2014 and is to be completed in two phases.

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High voltage power lines and endangered turtle crossings were just a couple of things that added challenges to the already complex construction of a 4 mi. (6.4 km) stretch of new highway and the construction of several bridges.

New construction of an extension onto Iowa Highway 100 in northern Cedar Rapids began in early June 2014 and is to be completed in two phases. Phase I, at an estimated cost of about \$70 million, is expected to be completed by 2018 while Phase II, which includes the paving of the first 4 mi. stretch, is still in the design phase but is expected to be finished by 2020. The 4 mi. Phase I segment runs from Edgewood Road Northeast to Covington Road. Phase II will run from Covington Road to U.S. Highway 30. When both Phases are complete, the project is expected to cost about \$200 million.

"Access to the project was one of our early challenges," said John Vu, project manager of the Iowa Department of Transportation, the lead developer of the

project. "On the east side of the river the only access crews had was from Old Ferry Road and so we first had to build a road to be able to get to the east side."

The new highway extension will aid in moving traffic in this rapidly growing section of Cedar Rapids. Traffic projections by the Cedar Rapids Community Development Department show that traffic on Edgewood Road is projected to increase from about 22,000 vehicles each day to about 32,000, and from about 20,000 to 39,000 each day on Highway 100.

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Drilled shafts for bridge abutments along Edgewood Road.

Crews Encounter High Voltage Line From Nuclear Plant

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It is projected by the Corridor Metropolitan Planning Organization that the area from the Cedar River to Interstate 380, which includes the Edgewood Road area, could see 5,419 new jobs and 9,392 new residents by 2040. Highway 100 will eventually connect the west side of Cedar Rapids to other businesses and communities north and east of the city. The connection at Edgewood Road will link to a segment of Highway 100 built between Interstate 380 and Edgewood Road Northeast in 1983.

The first part of Phase I includes preparation of the roadbed from Old Ferry Road to Ushers Ferry Road and the bridges for Old Ferry Road, Ushers Ferry Road and the Cedar River. Portions of the first 4 mi. stretch follow an old railroad grade and then veer off. Old railroad structures have had to be removed and wetlands were encountered, said Vu. "We built a new pond and a box culvert with two lanes, one as a dry crossing and one is a wet crossing, to accommodate endangered turtles living in the area, making it possible for the turtles to cross under the road."

The two year, Phase I portion is well underway by prime contractors Peterson Contractors Inc. (PCI), of Reinbeck, Iowa, and C.J. Moyna & Sons Inc. of Elkader, Iowa.

Subcontractor Kramer Construction Services Inc., of Des Moines, Iowa, is working on the Edgewood Road project, and a portion of the bridge over the Cedar River. Kramer Construction

also is teaming with United Contractors Inc. of Des Moines on the other two bridges.

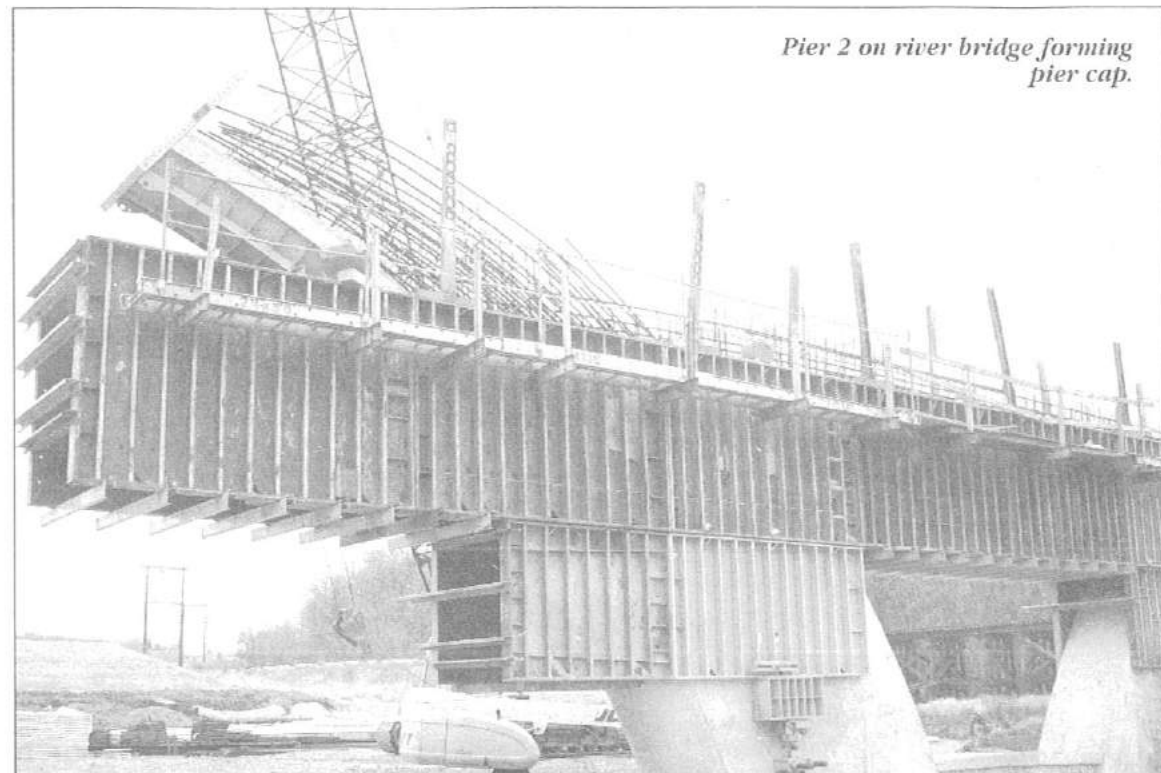
Grading on the west side is complete, Vu said. Grading on the east side was saved for work during the winter because the soil has already been cut and removed so crews don't have to worry about compaction of the soil. On the Edgewood road project, 24,000 yds. (21,945.6 m) of embankment is required, 210,000 yds. (192,024 m) of excavation will be done and there is another 137,000 yds. (125,272.8 m) of excavation waste.

However, some complications occurred at Ushers Ferry Road when crews encountered some forgotten railroad tracks and also ended up drilling through a box culvert that was forgotten about, Vu said. Crews also had to drill through an old abutment that was buried and relocate a sanitary sewer line because of the location of a pier. Other utilities also in the process of being relocated.

Construction on the three bridges is progressing at the same time.

The largest bridge is over the Cedar River and will consist of 9 spans with steel girders, and 8 piers. The \$46.7 million bridge will be 1,865 ft. (568.45 m) long and four lanes wide. The new bridge over the Cedar River will be higher and be beneficial to the community should a flood close other, shorter bridges in the area.

Currently, two of the piers are completely finished and three are in various stages of completion, while two haven't been started, Vu said. Work will continue through the winter months, temperatures



Pier 2 on river bridge forming pier cap.

allowing. "If we have lows in the low teens we can get in and out because the ground is frozen. Our average temperature is 10 degrees but if it gets below that we will stop work," Vu said.

The two smaller bridges, one at Usher's Ferry Road is two spans, while the one on Old Ferry Road is three spans. The bridge at Edgewood Road is one span.

Challenges continued while working on the bridge over the Cedar River. Crews encountered a high voltage transition line from the Duane Arnold Nuclear Plant. The transition line contains 134kv of voltage, Vu said. "It was not possible to de-energize the line because it goes directly into the

power plant. We are about five miles from that plant."

"We had to work around that line using a short crane to build the pier that was under the power line. We have the bottom half of the pier done and still have the cap to do" Vu said. "Instead of putting the entire pile in we had to cut it in half and install two short ones. ... We also had to put up a safety line that was 10 feet below the bottom wire warning us if we were getting too close. Crews put poles up in the air to string a safety cable with flags on it to warn us when we were getting close."

Then, on the west side of the river where the west abutment for the big bridge is, the soil conditions

were questionable. "About 260,000 cubic yards of contractor furnished embankment was required to shore up the west side. The area by the Cedar River required 308,000 yards of excavation," Vu says.

The design included some rigid inclusions on the west bank. The rigid inclusions went to right-of-way lines. "The contractor had to secure access to private property to get to the berm on that side. We could get to the top side but not the bottom," Vu said. "We had a 40 foot bank to get down."

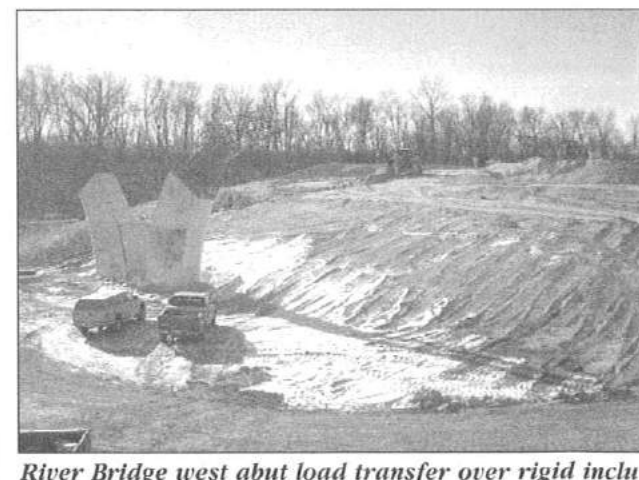
Vu continued, "We built concrete columns into the ground all the way to bedrock and the see HIGHWAY page 46



Pier 2 on river bridge completed.

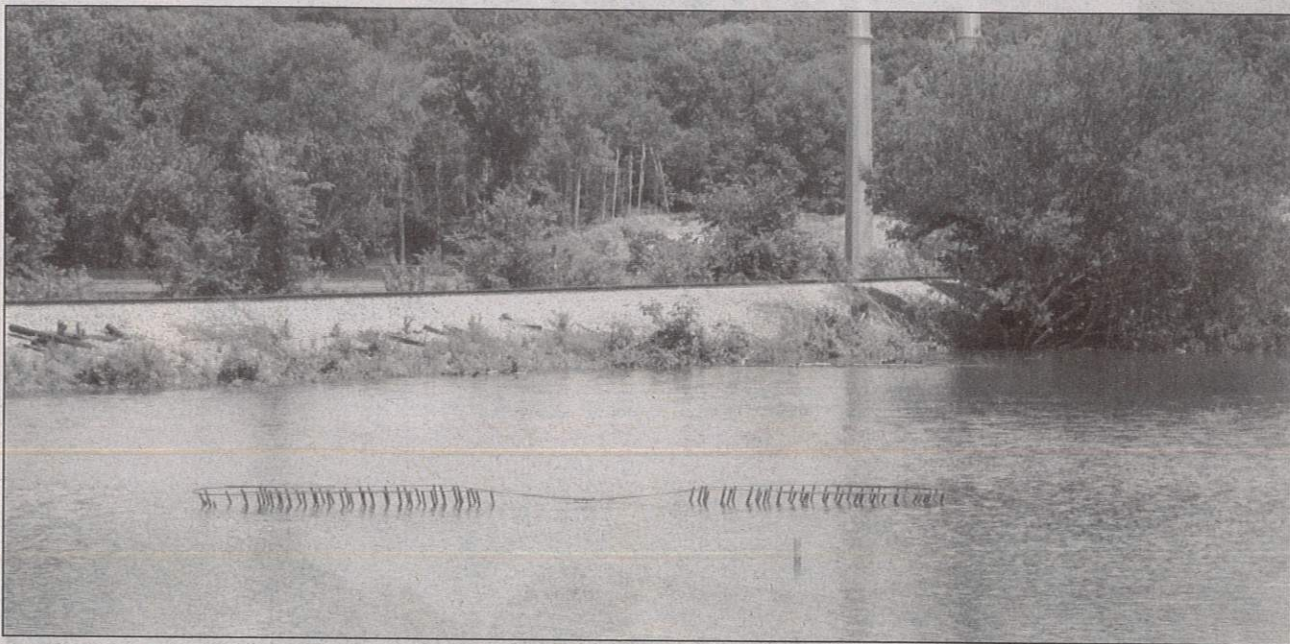


River bridge looking west from east abutment.



River Bridge west abut load transfer over rigid inclusions.

Design Includes Rigid Inclusions on West Bank to Right-of-Way Lanes



Cedar River flooding pier 1. Rebar from footing above water line.

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machine would push an 18-inch diameter ram all the way to the bedrock. As crews extracted the tool they filled it with concrete. Concrete columns were placed along a gridline that is 5 feet on center. This took many months to set." Additional concrete columns also were constructed for the road to sit on.

Once the inclusions were in place, geofabric was on top of them to the top of our embankment, Vu added. "That went much slower than we anticipated." Hayward Baker of Hanover, Md., was the contractor for those activities. "We installed instrumentation so we can monitor settlement and so we can move in course of next 6 months."

Using rigid inclusions is not a new technique in the construction industry but it is new to Iowa, Vu said. "This is the second location we have used the rigid inclusions. The first was on the Interstate 80 project in Council Bluffs, which is also currently under construction.

But even with this delay and a delay during the summer from flooding of the Cedar River, grading is still expected to be finished by the fall of 2015 and the paving is expected to be finished by 2016, according to Vu. "If the bridge over the Cedar River doesn't get done we can finish the paving in 2016 when the paving contract is under way."

Another little hiccup in the project occurred on Covington Road. Work on this \$5.6 million Covington Road project

meant Covington Road would have to be closed for about a year to construct a bridge at the Covington and U.S. Highway 100 intersection. "This was to start but it hasn't," Vu said. "The contractor wanted to use Covington to transfer materials and didn't want to close the road, and city of Palo wanted the road for access by its emergency responders. And we saw the benefit of leaving the road over the winter so we will look at starting this project in the spring and then complete it in one season instead of two. This was agreeable to all," Vu said.

The Covington Road project is expected to require 234,000 yds. (213,969.6 m) of embankment and 67,000 yds. (61,264.8 m) of excavation.

To help move things along, air track drilling was done ahead of the construction of the substructure units on the Ferry Road bridges. "The substructure on the Ferry Road bridges required drill shafts but ahead of that we had to drill pilot holes to see if rock was solid or had voids," Vu said.

On the Covington Road project, "instead of excavating for the bridge and doing the air tracks and then doing a review, we went ahead and drilled through the road and the berm so we didn't have to wait for materials to be ordered," Vu said. Ordering the materials earlier and having them on site helps speed up the process to help

ensure contractors will be able to get the project done in one season.

Phase I also includes the construction of an \$18 million single point urban interchange at Edgewood Road, which is only the second of its kind in the state. A similar interchange is located on Interstate 35 at Mills Civic Parkway in West Des Moines.

A single point urban interchange (SPUI) is similar to a diamond interchange, which has two intersections, one on each side of bridge, but a SPUI allows opposing left turns to proceed simultaneously by compressing the two intersections of a diamond into one single intersection in the center of the bridge, Vu said. "With a diamond interchange, traffic stops at one light and crosses the bridge and goes on to the next light. With a single point there is only one light and it has multiple phases of signal so each ramp can move or the main line can move."

Having one traffic signal makes it possible for vehicles to clear the intersection quicker than in a diamond interchange. SPUIs also allow for wider turns, making it easier for large vehicles to maneuver the turn. And SPUIs takes up less space than a full cloverleaf interchange, meaning construction can take place on less property.

(This story also can be found on *Construction Equipment Guide's* Web site at www.constructionequipmentguide.com.) CEG