

CASE STUDY

US 34 Missouri River Connector

Iowa/Nebraska border

HISTORY

The Missouri River is the longest river in North America and a major source of transportation and commerce in the central United States. Beginning in the Rocky Mountains, the Missouri River runs over 2,300 miles before spilling into the Mississippi River.

Just south of Omaha, Nebraska (pop. 420,000), the Platte River flows into the Missouri, creating a state border with Iowa to the east. Along nearly 30 miles of the border, there is just one bridge spanning the river, the Plattsmouth Bridge, built in 1929 as a toll bridge to carry U.S. Highway 34 west out of Iowa into Nebraska. Highway 34 wanders into the town of Plattsmouth before connecting with U.S. Highway 75, a route leading north into Omaha.

The Greater Omaha-Council Bluffs metro area sits in one of the busiest freight corridors in the United States, at the crossing of two major interstates (I-29 and I-80) and a pair of major railroads.

The original connection was two narrow, two-lane bridges. Over time, the route saw a steady increase in travel time for commercial and personal vehicles and an uptick of accidents. Meanwhile the regional economy, which includes nearby Offutt Air Force Base (the top employer in the Omaha-Council Bluffs metro region), became stifled.

The project was pitched as a jobs creation engine that can “unlock a vast potential for economic development and job growth.”

According to a study by the Iowa Department of Transportation, the creation of a new US 34 Missouri River Connector could provide more than \$550 million in benefits to the two states



over a span of 25 years. The study also showed that nearly 40,000 jobs could be created between 2010 and 2038.

PROBLEM

The first of three phases in a new connector project called for a new bridge 10 miles north that would cross the Missouri River above its congregation with the Platte River.

The new span would include two pier foundations in the riverbed where unfavorable soil conditions existed.

Two flood cycles on the Missouri and the presence of an endangered fish (pallid sturgeon) limited the timeline for construction. Driving of steel could not occur between

February and June, due to the mating patterns of the fish.

SOLUTION

Nucor Skyline’s spiralweld pipe pile was an ideal choice for the load-bearing construction in unfavorable soil conditions: It can be produced in a variety of sizes, grades and lengths. Testing has shown the high quality spiralweld pipe to be as strong as API pipe, and has numerous commercial advantages, including price and availability.

Steel pipe pile was chosen because of its geotechnical and structural capacity advantage over H-pile, and also for its constructability advantage over concrete drilled shafts for soil conditions on this specific site. The design

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length for H-piles and concrete drilled shafts was too deep. Using pipe piles minimized the constructability risks for the river piers.

Furthermore, the pipe pile gave the project partners a more economical solution for the overall construction of the new transportation connector between southwest Iowa and southeast Nebraska.

The \$61 million project started in late 2011. Two piers were built to span the river, one on the embankment of the Nebraska side to the west and one in the middle of the Missouri River.

Skyline fulfilled a direct order for 85-foot lengths of sheet pile used to construct a temporary cofferdam. The AZ-19-700 sheets came from directly from partner ArcelorMittal and shipped through the St. Lawrence Seaway and across the Great Lakes into Gary, Indiana and delivered to the site by truck. A collection of PZ35, manufactured by Skyline to 80-foot lengths for a separate project, was utilized on the second cofferdam. Construction of the cofferdam surrounding the pier in Nebraska began immediately. Driving of the steel for the temporary structure needed to be completed before the annual migratory season of the

endangered sturgeon.

The design of the new bridge span called for supports with ultimate lengths of wall pipe pile with 30' by 140' and 30' by 135'. Skyline provided 48" by 1.00" pipe pile, delivered from its luka Plant in Mississippi at 50-foot lengths.

The soil consistency at Piers 5 and 6 made for differing driving conditions. In the middle of the Missouri River, driving the pipe piles down through sand was fairly easy. Yet on the western bank -- the Nebraska side -- a decent amount of rock (rip rap and layer of cobble stones) made up the shoreline stabilization. Even so, the contractor did not encounter delays in the driving schedule. The pipe piles were driven on site to rock, open ended, and then cleaned out with airlifting. Minimal delays to the schedule occurred during the cleaning out process.

Skyline also delivered piling for the 17 piers on land and the two abutments. Over 3,500 tons of H-pile, made from 100 percent scrap and 100 percent recyclable steel, was railed to Skyline's yard in Omaha where pile points were attached. The H-pile, shipped to the job site in lengths of 70 feet, served as bearing piles for

15 piers and ranged in lengths from 120 feet to 175 feet. Jensen Construction spliced the H-pile to its ultimate lengths on site.

The bridge foundation portion of the overall project was completed in 2013, with the entire US 34 Missouri River connector end date anticipated for late 2014.

PROJECT PARTNERS

Owner

Iowa Department of Transportation

Contractor

Jensen Construction Company
Des Moines, Iowa

Engineer

Iowa Department of Transportation

PRODUCTS

2,400 tons of AZ52 Grade 3 pipe pile;

3,500 tons of HP 14x89; AZ19-700, PZ35 for cofferdams