

Recent Projects

Paseo Bridge Pier Demolition

By David Hersey



Figure 1. The old Paseo River Bridge before construction.

The Paseo Bridge was located at the I-29/I-35/US-71 Missouri River Highway Crossing. It was built between 1952 and 1954 by Massman Construction Company. The 1,232 foot long, self-anchored suspension bridge was the longest of its type when built. On Jan. 22, 2003, a connector pin designed to allow the bridge to expand and contract during temperature cycles seized and caused a portion of the bridge deck to raise up and block traffic. This marked the beginning of the end for the old Paseo Bridge.



Figure 2. The old Paseo Bridge and new Christopher S. Bond bridge, before the old bridge was taken down.

The Missouri Department of Transportation performed emergency repairs and then kept the old bridge functional while funding for a replacement bridge was secured. In 2005, the funding was in place and from that time forward, only minimal work was done to keep the bridge operational and safe.

The project team responsible for constructing the replacement bridge consisted of a group of five well-established companies with long histories of successfully completed significant bridge projects. The joint venture included Clarkson Construction, Massman Construction, Kiewit Construction, Parsons, and TranSystems. Collectively they operated as the Paseo Corridor Constructors. Time was a large factor in this project so the bridge was designed and built as a part of the same contract.

Construction for the new bridge began on April 18, 2008. In order to keep traffic flowing, the new bridge was built just downstream from the old Paseo Bridge. Some approach lanes and ramps had to be moved to accommodate the construction and to keep four lanes of traffic open throughout the project. The first lane of the new bridge was opened on September 27, 2010, with the final lane of the new bridge being opened on December 18, 2010. Upon completion of the new bridge, named the Christopher S. Bond Bridge, the Paseo Bridge was then closed completely.

The US Army Corps of Engineers required that the old bridge be removed within 90 days of being closed. Dismantlement of the Paseo Bridge began in November, 2010, and continued through the spring and summer of 2011. The demolition of the bridge was significantly hampered by a record setting flood that forced the Missouri River to be closed for several months during that spring and summer.

Notwithstanding the difficulties presented by the flooded Missouri River, the demolition phase of this project pre-

sented some unique challenges as well. The Paseo bridge was one of only two remaining self anchored suspension bridges left in the United States and it was setting within 6 feet of the new Bond Bridge. It was necessary to dismantle the bridge in the reverse order in which it was originally constructed.

First the bridge's median and safety barrier was removed. Then followed the asphalt driving surface and then the underlying concrete deck was cut into rectangular pieces small enough to be handled by the onsite cranes, picked, stacked and hauled away for disposal. Water-filled weights were used to counterbalance the bridge during deck panel removal.

Next, the stringers that supported the concrete deck were cut and removed. Then the demolition crew removed portions of the bridge's floor system which included about half of the steel floor beams and all of the wind bracing.

Temporary supports then had to be constructed under the Paseo's two exterior steel abutment girders to shore up the remaining bridge while the suspension cables were removed from their anchors. Next, the top of the towers with cables still attached were cut and a jacking system was used to lower the two 1,300 foot long, 500,000 pound tower struts and suspending cables to the roadway level.

Cranes were used to support the bridge's remaining edge girders as crews cut them into 100-foot pieces, weighing approximately 200,000 pounds each. Then after being placed on a barge, they were sent to be recycled. This left the tower legs which were removed and finally, the bridge's concrete abutments were conventionally removed leaving the one single concrete support pier in the Missouri River. This pier was conventionally demolished down to a construction joint a few inches above the river's water level which was still several feet above flood stage.



Figure 3.



Figure 4.



Figure 6.



Figure 5.



Figure 7. Placing the geotechnical fabric.

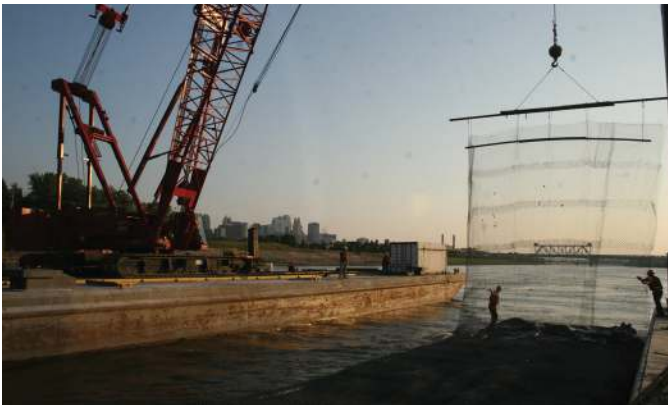


Figure 8. A woven chain link fencing was placed on the pier surface to protect the nearby bridge.

Dykon's drills were loaded on a work barge and drilling commenced on the remaining concrete river pier. The contract required that the bridge pier be removed to below the river bed mudline. Holes were drilled 42 feet deep in order to achieve the desired depth.

The concrete pier had three open cells in the center with large massive bulkheads on the up and downstream ends to guard against river traffic impact. The bulkheads were solid down to 21 feet below the river surface where they were hollow from there down to grade. There were cells within the concrete at different levels which created difficulties in drilling and loading. With the holes being 42 feet deep, and the exterior walls of the pier only four feet thick accuracy in drilling was critical. The blastholes had to be drilled through numerous cavities and levels constructed within the pier and still be within acceptable tolerance in order for the explosives to work properly. It was a challenge to get the blastholes drilled so that the energy would be evenly distributed throughout the concrete to be shot.

The blastholes in the center wet wells and through the

various cavities and hollow areas were carefully logged and cased to allow for the proper placement of the explosives. Once this was completed, the entire pier surface was covered with geotechnical fabric and several layers of woven chain link fencing to protect the nearby operational bridge from damage.

The proximity of the new bridge was such that traffic had to be stopped for the shot. It was planned to detonate the charges at midnight so that traffic over the bridge and on the Missouri River was at a low point. Several boats with powerful searchlights were deployed to secure the river of traffic. The Kansas City Police Department mobilized to help with traffic control on the bridge and on the nearby access roads. Then at midnight, after a brief countdown over communication radios and a muffled rumble like distance thunder, the pier which had supported the Paseo Bridge for many decades became a memory.

When the Paseo Bridge was first constructed, it was the longest bridge of its kind ever built. It represented the height of man's engineering and construction capability in its class. Now, decades later, it has been replaced with a new bridge that is a fitting testament to our engineering capabilities in the 21st century. It was appropriate that a one of a kind bridge be replaced with another one just as unique.

The shot went as planned. The rubble left behind after the detonation was easily excavated and nothing now remains of the old bridge but a ripple in the mighty Missouri River where it weaves around the base of the Paseo's magnificent successor.

Acknowledgements


We at Dykon Blasting would like to take this opportunity to thank the Paseo Corridor Constructors and the Kansas City Police Department for their help in making the explosive demolition of this project a complete success. 



Figure 9. The new Christopher S. Bond Bridge.