St. Anthony Falls (I-35W) Bridge

INTERSTATE 35W

Project Overview

Opening by Dec. 24, 2008

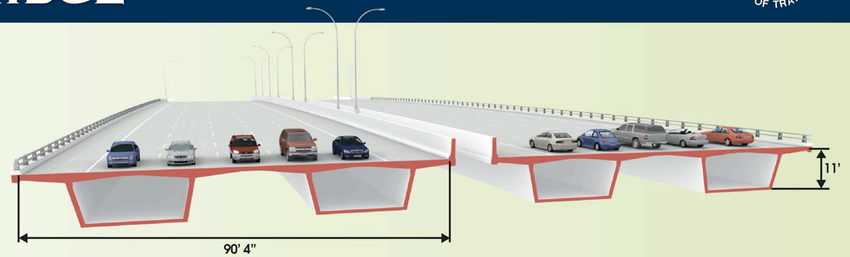
Construction on the new St. Anthony Falls (I-35W) Bridge began Oct. 8, 2007, and is scheduled to be complete by December 24, 2008. The Design/Build Team includes Flatiron-Manson Joint Venture, FIGG, and the Minnesota Department of Transportation (MnDOT).

By the Numbers

- **15:** Projected number of months the bridge construction will take from start to finish
- **100:** Minimum number of years the new bridge is expected to last
- **504:** Length (in feet) of the main bridge span across the Mississippi River
- **650:** Number of people it will take to build the bridge
- **1,000:** Miles of post-tensioning steel that will be used to hold the concrete segments of the bridge together
- **1,223:** Length (in feet) of the finished bridge
- **48,700:** Cubic yards of ready-mix concrete that will be used to build the bridge (that is equivalent to eight miles of a two-lane concrete road)
- **141,000:** Number of cars that crossed the old I-35W bridge each day
- **17 million:** Pounds of reinforcing steel that will be incorporated into the bridge structure (roughly equivalent to one KIDD-Class Navy Destroyer)

Bridge Cross-section

The new bridge will have five traffic lanes going each direction (the old bridge only had three lanes going each way), and it is designed to accommodate light rail transit in the future. If LRT is incorporated in the bridge, traffic lanes will be reduced from 10 to eight, and the two lanes along the center of the bridge will be converted to LRT tracks.



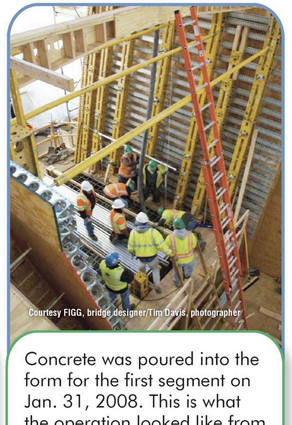
Casting Yard – The Inside Story

Courtesy FIGG, bridge designer/Tim Davis, photographer

Looking to the southwest from here, you can see the casting yard, where segments for the main span of the bridge are being pre-cast in climate-controlled shelters on an unused section of I-35W just north of Washington Avenue.

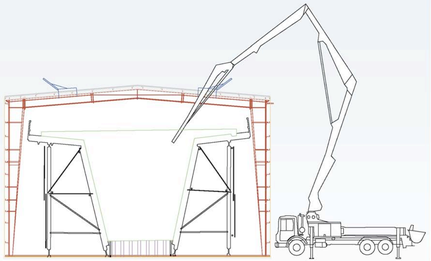
Courtesy FIGG, bridge designer/Tim Davis, photographer

This aerial view of the casting yard (taken Feb. 22, 2008) shows four of eight casting beds built to support the forms for the pre-cast segments that will comprise the main span of the bridge. The completed segments will be trucked to the river's edge and hoisted into place by a barge-mounted ringer crane later this year.



Courtesy FIGG, bridge designer/Tim Davis, photographer

Concrete was poured into the form for the first segment on Jan. 31, 2008. This is what the operation looked like from inside the heated shelter, where the temperature is maintained at about 60 degrees Fahrenheit. The long black hose is connected to a concrete pump truck outside.



Each segment is 42 feet wide, 16 feet long, and up to 25 feet deep, and weighs 150 to 200 tons. A total of 120 segments are needed for the 504-foot main span of the bridge. Segments will be cast at an average rate of one a day until they are done.

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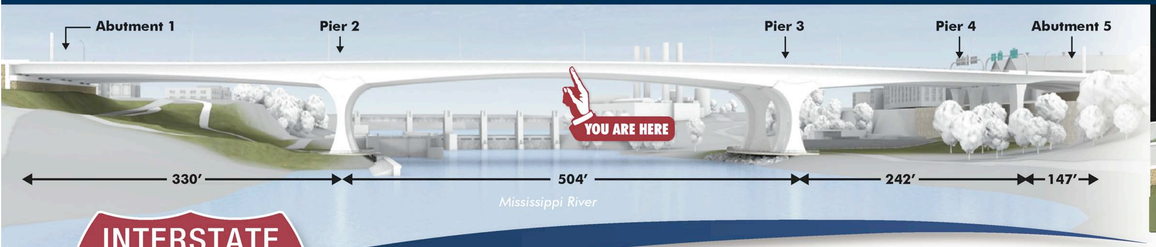
Main Span of St. Anthony Falls (I-35W) Bridge



Smart Bridge

Sensors embedded in or mounted to the bridge will provide information to engineers about the structural behavior of the bridge. For example, vibrating wire strain gauges installed in select locations (pictured) will measure how the bridge is resisting loads and the temperature of the concrete. Other sensors will measure bridge movements, deflections, and chloride penetration. Mn/DOT will work closely with the Federal Highway Administration and the University of Minnesota to monitor this data throughout the life of the bridge.

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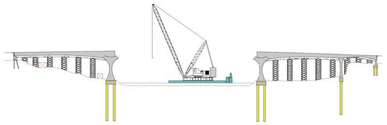
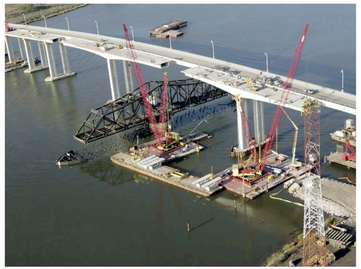
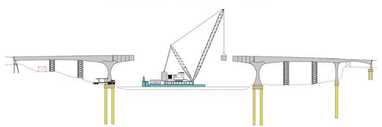
Main-span Erection

Assemble ringer crane on barge





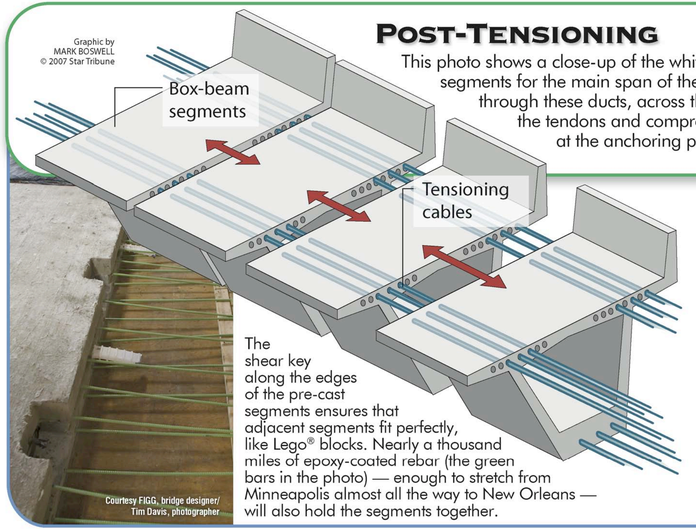
Erect cantilevered main span

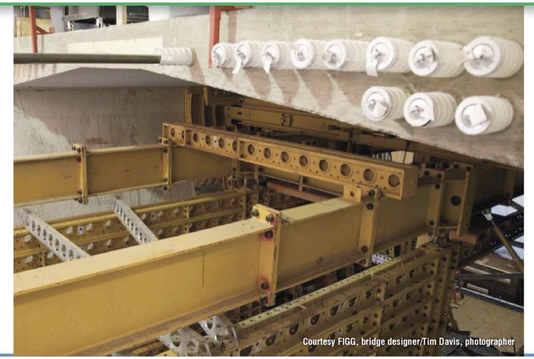


Starting this spring, the 120 concrete segments that were made in the casting yard this winter will be trucked to the river's edge, and a barge-mounted ringer crane will lift them into place to form the main span of the bridge. These photos show how the same process was used to construct bridges in New Jersey (left) and Maine (right).

Post-Tensioning

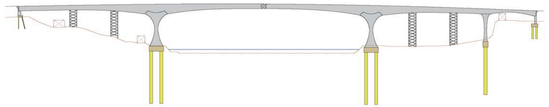
This photo shows a close-up of the white post-tensioning ducts embedded in each of the 120 pre-cast concrete segments for the main span of the bridge. One thousand miles of high-strength steel tendons will run through these ducts, across the top and bottom of each segment. A hydraulic jack will be used to pull on the tendons and compress the segments tightly together. As the tendons are pulled through wedges at the anchoring points, they are gripped with steel teeth that hold them permanently in place.





Complete Superstructure Erection

Once all 120 pre-cast segments are in place, the gap in the center will be closed with one final concrete pour. After that, the finishing work will include adding rails, safety lighting, signs, and striping.



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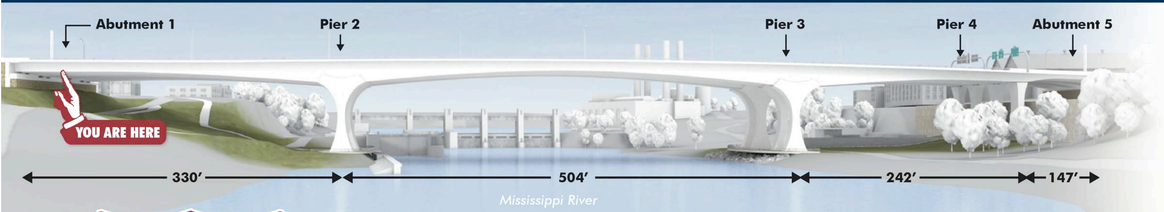
South End of St. Anthony Falls (I-35W) Bridge



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Foundations, Abutments & Side Spans

You are facing Abutment 1, the south wall of the bridge. The area left of the abutment will eventually be filled in with dirt. To the right of the abutment, crews are building the temporary steel scaffolding (also known as "falsework") that will support the forms for the side spans.

Building the Bridge Foundations

The foundations of the bridge were constructed between early November and early February. Workers used large augers, up to eight feet in diameter, to drill the foundation shafts.

Pouring Concrete

Crews poured concrete for the footing of Abutment 1 on Dec. 17, 2007. See it coming out of the black hose?

Building Superstructure

The side spans will be "cast in place"—as opposed to cast offsite and delivered—this spring. The concrete will be poured into large forms that will rest on these temporary steel supports. When the side spans are done, the supports will be removed.

Finishing the Abutments

The abutments at each end of the bridge will feature native stone.

North End of St. Anthony Falls (I-35W) Bridge

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The Piers

Twelve massive concrete columns called piers, each 70 feet high, will support the bridge.

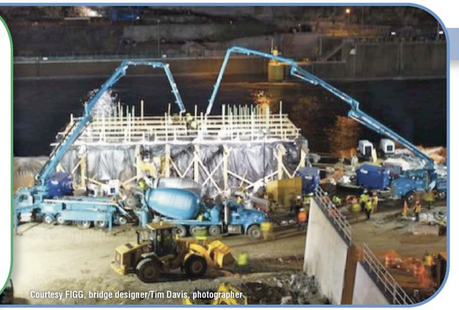
Drilling the Foundations

Each pier has a foundation made up of eight drilled shafts, which are 7 feet to 8 feet in diameter and approximately 100 feet deep. The shafts are socketed into bedrock, reinforced with lots of rebar, and then filled with concrete.

Pouring the Footing

On top of the foundation shafts, at the base of each pier, is a giant footing. It took 140 trucks to supply the concrete for the footing at Pier 3 on a cold night in mid-January.

This is what it looked like from the outside...



Inside the Footing at Pier 3

...and this is what it looked like on the inside.

Placing Rebar and Forms at Pier 4

Once the footing is done, crews place the rebar and forms for the columns. This photo shows some of the rebar in place for the two columns that will support the northbound lanes of the highway.

Pouring the Columns

Most of the columns were poured in three stages or "lifts." This photo shows the first lift of a column at Pier 4 being poured in mid-February.

Stripping the Forms

After the columns have achieved sufficient strength and the temperature of the concrete and the outside air are within 45 degrees of each other, the forms can be removed. The first forms were removed from the columns at Pier 3 southbound (pictured) on Feb. 23. The last of the concrete for the columns was poured on March 13.

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