



DSI References



Owner Minnesota Department of Transportation, Minneapolis, Minnesota, USA+++ **General Contractor** Flatiron Constructors, Inc. and Manson Construction Company Joint Venture, USA
DSI Unit DSI USABU Post-Tensioning, Chicago, Illinois, USA
DSI Scope Supply of 1,300km 0.6" 270k strand; 4,100 Anchorages; 9,000m GEWI® Bars and hardware for formwork 57,000m 63 mm Ø GEWI® Bars with hardware for reinforcement Post-Tensioning installation, stressing, and grouting equipment Engineering services related to Post-Tensioning Remedial grouting services using the vacuum grouting method



Minneapolis' I-35W Bridge over the Mississippi River Reconstruction within Record Time

St. Anthony Falls Bridge, Minneapolis, MN, USA

On August 1st, 2007, a steel truss arch bridge built in 1967 across the Mississippi River in Minneapolis, Minnesota collapsed during the afternoon rush hour. 13 people lost their lives and over 100 others were injured in this tragic bridge failure.

Carrying 140,000 vehicles per day, the I-35W Bridge was one of the busiest bridges leading over the Mississippi River. This bridge was an extremely important connection for the citizens of Minneapolis and St. Paul, particularly for the business people in the center of the metropolitan area. The economic loss caused by this accident has been estimated to be in the range of 400,000 USD per day.

The bridge had to be replaced as soon as possible for everyone's benefit. A structure of this type would take at least three years to construct under normal circumstances, not including at least one additional year for design. However, due to the paramount importance of this connection across the Mississippi and the daily negative financial impact to the community, all imaginable measures were taken to cut down construction time as much as possible.

The owner decided to employ the designbuild method of project delivery. A short-list of four qualified bidders was established consisting of contractors and designengineers together forming each team. Three of the four teams proposed steel, plate girder type bridges, with the fourth proposing a post-tensioned concrete box girder bridge. Ultimately, the concrete design won over the judges even with the higher cost and more days to complete.

The new, approximately 371m long bridge consists of four separate parallel box girder structures resting on eight elegant piers. With its modern design, the double bridge pays tribute to the versatility and durability of the construction material concrete. The safety of the bridge was of utmost importance at all times. High performance post-tensioned concrete ensures high quality and lasting durability, while at the same time providing an aesthetically pleasing design. In addition to state of the art construction methods and top grade materials, sensors integrated into the structure will allow for substantial and continuous monitoring of the bridge in the future.

Each bridge has a main span of 154m that consists of precast concrete box girder segments supported by eight 21m high piers. The end spans are 108m long each cast-in-place, post-tensioned concrete box girders built on false work which seamlessly blends into the precast main span sections. Each of the Northbound and Southbound, 28m wide bridges can accommodate 5 lanes of traffic. Additionally, both the foundation and superstructure can accommodate future light rail expansion as well as a bus lane. The parabolic shape of the double bridge is created by the specially formed piers as well as the box girder with its variable depth ranging from 7.6m at the pier to 3.4m at main span.

Production of the 120 precast box girder segments took place in a nearby casting yard set up on the closed section of the I-35W roadway. The segments were cast using the long-line casting method in one of the coldest winters Minnesota has experienced. DYWIDAG 4x0.6" FMA Multistrand Tendons were installed transversely in the segment top slab and prestressed and grouted in the casting yard. Afterwards, each precast segment was moved to a staging area on the riverbank where they were then barged under the bridge. A barge mounted crane lifted each segment into position where 36mm diameter DYWIDAG THREADBAR® were used to temporarily hold the segment. DYWIDAG 19x0.6" Multistrand Tendons were used to permanently post-tension the segments longitudinally. DYWIDAG 19x0.6" and 27x0.6" Multistrand Tendons were threaded throughout the entire box girders in both top and bottom slabs. Finally, these tendons were all stressed and then pressure grouted.

All in all, DSI was a key supplier for this monumental project. 1,300km of prestressing strand was supplied as well as 4,100 Anchorages for the Post-Tensioning. DSI USA also supplied over 9,000m of GEWI® Bars and hardware for the Form Ties and false work bracing. A total of over 57,000m 63mm Ø GEWI® Bars, as well as over 2,000 63mm Ø Couplers were used for vertical reinforcement of the drilled shaft foundation elements. DSI USA also supplied all posttensioning installation, stressing, and grouting equipment required to complete this project.

DSI USA supplied all Multistrand Tendons for the new Mississippi River Bridge just-in-time from their nearby Suburban Chicago, Illinois plant. The high quality and simple handling of the DYWIDAG Multistrand Tendons perfectly matched everybody's vision for highest possible performance within an extremely short time period. In fact, the last of the 120 precast segments was installed only 46 days after the first unit. This equals an average of nearly three segments erected per day.

DSI is proud to have contributed to the extremely rapid replacement of this important bridge.



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