

## Steel Bridges Offer Strength in Flood Prone Areas

**Bridge 54550 and Bridge 54549**  
Norman County, Minnesota



### BRIDGE FACTS

**LOCATION:**

Perley and Shelly, MN

**OWNER:**

Norman County, MN

**LENGTH:** Bridge 54550:  
802-feet long; Bridge 54549:  
700-feet long

**TYPE:** Steel beam span

Located in northwestern Minnesota, Norman County is perhaps best known for its vast production of sugar beets, soybeans and spring wheat among other crops. In fact, of the county's approximate land area of 566,500 acres, about 457,670 acres are used for farmlands that depend on rain and water provided by local rivers such as the Red River of the North, the Wild Rice River and the Marsh River. Norman County is one of the top five agricultural producers (by tonnage) in Minnesota.

During extreme weather events, some of these areas are prone to flooding, particularly along the Red River region. Flooding and weakened soil conditions have taken a toll on bridge foundations in some parts of the county, and, like other parts of the country, many bridges in Norman County have exceeded optimal design life and need to be replaced.

In these cases, the Norman County Highway Department often relies on similar materials used decades before—while incorporating some modern advancements.

Recently, the department looked to replace two bridges that span the Red River of the North. At about 70 years old, the original steel high truss bridges had exceeded their life spans and begun to show deterioration. Norman County contracted Erickson Engineering of Bloomington,

MN to design replacement bridges.

The bridge foundations caused significant concern for engineers. The soils in this area are typically soft and the area is prone to flooding. Therefore the new bridges needed to incorporate design elements that minimized the amount of grade raise and also allowed for potential movement, due to the poor soils.

Mick Alm, Norman County Highway Engineer with the Norman County Highway Department, says, “We were concerned about ice jams and debris accumulation during flood events.”

Tom Wilson, vice president of Erickson Engineering, says, “The soft soils and occasionally extreme river flows required that we carefully consider pier movement and also minimize the amount of grade raise. In our experience, steel superstructures and substructures offered the best solution for both bridges.”

Bridge 54550 near Perley is 802-feet long, with nine spans and a 36-foot roadway width. Bridge 54549 near Shelly was slightly shorter at 700-feet, with only six spans and a 36-foot roadway width.

“Steel beams with steel hinges on the piers were really the only practical alternative,” says Wilson. “In partnership with Norman County engineers, we opted to use 36-inch and 40-inch deep rolled steel. The concrete equivalent would have been 54-inches and 63-inches, putting more loads on the existing soils. With the 36-inch and 40-inch rolled steel beams, we had less grade raise.”

The old bridges were removed and new bridges constructed over the course of two spring/summer construction seasons.

Norman County’s Alm concludes, “Despite harsh winter working conditions, several flood events and occasional rain-outs, the bridges were finished within the prescribed number of working days and within the budget.”

### **About the Short Span Steel Bridge Alliance**

The Short Span Steel Bridge Alliance (SSSBA) is the industry resource for information related to short span steel bridges in North America. SSSBA’s objective is to provide essential information to bridge owners and designers on the unique benefits, innovative designs, cost competitiveness, and performance related to using steel in short span installations up to 140 feet in length. Alliance members include bridge and culvert industry leaders, including manufacturers,



fabricators and representatives of related associations and government organizations. To learn more visit [www.shortspansteelbridges.org](http://www.shortspansteelbridges.org) or email [sssba@steel.org](mailto:sssba@steel.org).

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**Steel Superstructure**

- Less deadload on foundations
- Shallower depth of section to reduce approach grade raise



**Steel Substructures encased in concrete**

- Hinged steel elements allow for movement in foundations
- Concrete provides protection against flood and debris