

METAL TRUSS BRIDGES

Tobias Bridge, Jefferson County, Indiana

Location and Description of Setting:

The Tobias Bridge carries County Road 1350 West over Big Creek in Jefferson County, Indiana. The bridge is located on a one-lane, local road in a rural setting.

Description of Bridge:

The Tobias Bridge was fabricated in 1885 by the Indianapolis Bridge Company. It is a 154 foot-long, pin-connected wrought iron Whipple through truss bridge, and is the last metal truss bridge left in the county.

Figure 11. Tobias Bridge



Rehabilitation Project Information

Date/Cost for Rehabilitation:

The bridge was rehabilitated in 2004 for about \$900,000 by Jefferson County.

Project Designer:

J. A. Barker Engineering, Inc.

Bridge Owner/Client:

Jefferson County, Indiana

Source for Additional Information:

James Olson
Jefferson County Highway Engineer
300 East Main Street
Madison, Indiana 47250
jchd@siedata.com

Project Information**1. Significant issues associated with project (e.g., bridge condition, reasoning behind decision to rehabilitate versus replacement, reasoning behind selected maintenance activity).**

The Tobias Bridge is the last remaining example of its type in the county. This prompted the county highway engineer and county commission to consider rehabilitation rather than replacement as a means to increase the bridge's load carrying capacity, from three tons to 14 tons (the post-rehabilitation capacity).

2. Project description, including purpose and need.

The bridge's low load carrying capacity was controlled by the light design of the verticals, composed of Z-shaped plate commonly used by the railroads. The challenge was to develop a way to increase their capacity and preserve their distinctive detail, as well as repair those that were bent or bowed. After considering several schemes, a decision was made to install additional plate to the outside of each vertical. The plates were connected using high strength button head bolts to keep the look of the original rivets, but at a lesser cost. Heat straightening was used to repair out-of-plane members. The historic look of the lattice railings inside the truss lines was preserved by welding them to modern tubular railings, providing an adequate safety feature that maintains a historic appearance. Cracked members in the ornamented portal braces were repaired, and the bridge was cleaned and painted.

3. Lessons Learned.

The county recognized the cultural value of the bridge and wanted it preserved and kept in service, and accepted that the end product would be a one-lane wide bridge with a 14-ton load carrying capacity. The county also retained a consulting engineer with a strong historic bridge rehabilitation record, and who had experience with developing practical ways to make truss bridges adequate while preserving historically significant details, like the Tobias Bridge's unusual verticals.

The project highlights several cost-effective rehabilitation techniques. Button head high-strength bolts were used instead of rivets as a more economical way to connect the new plates to the verticals. Heat straightening was used to bring members back into plane, demonstrating the cost effectiveness of this underused but cost-effect technique. Welding was used to repair cracks in the cast- and wrought-iron members in the portal braces, which, like the heat straightening, results in original fabric being conserved and preserved rather than replaced. The railings represent a practical solution by marrying old with new and providing a traffic railing that will also protect the truss lines.