



J-U-B ENGINEERS, Inc.

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March 05, 2009

Doug Moore, Public Works Director
Coalville City Corporation
10 North Main
Coalville, Utah 84017

RE: Bridge No. 043039F over the Weber River, Coalville, UT
Site Visit and Structural Review and Analysis Update

Dear Mr. Moore:

At the request of Coalville City, Utah, J-U-B ENGINEERS, Inc. made a site visit to the above referenced bridge to observe the condition of the bridge. Steve Roberts and Robert Whitely of J-U-B ENGINEERS, Inc. met Doug Moore, Public Works Director and Steve Richins, Councilman, of Coalville City at the site on February 26, 2009.

This site visit follows a previous review of the bridge conducted in September of 1998 by J-U-B ENGINEERS, Inc. in conjunction with Monroc, Inc. A structural review and analysis of the bridge was performed in order to respond to UDOT's maintenance and safety inspection letter dated July 7, 1998 and to make recommendations to Coalville City. A letter dated September 21, 1998 was provided to the City that contained a report of the work completed on the project and J-U-B's recommendations.

During the February 26, 2009 site visit it was observed that the asphalt overlay on the bridge was in very poor condition with numerous cracks and large holes that exposed gaps between the prestressed concrete (double-tee) girders below. Some corroded reinforcing steel was observed in the top flanges. It was decided that the asphalt should be removed from the bridge deck because of its poor condition and to observe the condition of the rest of the bridge deck.

On March 4, 2009 the asphalt overlay was removed from the bridge by Coalville City. Mr. Roberts met Mr. Moore again at the bridge site to observe the bridge conditions. It was observed that the most significant damage was in the top flanges (bridge deck) of the girders. The concrete has spalled, causing exposure and corrosion of the reinforcing steel. The grout in the joint between the center and the northern girder is gone. This has resulted in a large gap between the girders and significant damage to the top flanges at the joint. Scour problems were observed behind the wing walls. The river channel was only visible at one abutment with no signs of scour at the abutment. However, an underwater inspection performed on 11/7/94 by Parsons

Brinkerhoff Quade & Douglas, Inc. found some localized degradation in the footings along one of the abutments.

Condition Summary

The problems with this structure can be summarized as follows:

1. The bridge was constructed with double tee prestressed girders that are not of adequate strength for the maximum legal highway loads (even in an undamaged condition.)
2. There is substantial damage to the concrete in the top flange of the girders that form the bridge deck.
3. Steel reinforcing is exposed and is corroded.
4. There is a large gap (several inches) between the top flanges of two of the girders. This creates a safety hazard for vehicle traffic.
5. The steel pipe bridge railing is corroded – especially at the anchorage to the concrete bridge deck. This is a life safety hazard as it does not provide an adequate crash resistant barrier. It is very likely that the railing would fail as a result of even a low level vehicle impact with the risk of the vehicle plunging into the river below.
6. There are no approach railings at the approaches to the bridge. This is also a safety risk as it provides no barriers to prevent an errant vehicle from plunging over the embankment.
7. Based on previous inspections by others there is evidence of voids under the footing of one of the abutments. This condition decreases the support strength of the bridge abutment.
8. A load rating of the bridge was performed. However, the amount of prestressing is not accurately known and had to be estimated. Also, the bridge has physical damage that has decreased the strength of the structure significantly. Therefore, the load rating is only an estimate of the strength of the structure.

Recommendations

Because of the problems outlined above, our recommendation is to close the bridge to vehicle traffic and replace the structure. Barricades should be placed at both ends of the bridge. This option eliminates safety risks to the public due to vehicle traffic on the bridge.

As an alternative to closing the bridge, the city may consider leaving the bridge open, but limiting the weight of the vehicles using the bridge. There would be a need to mitigate the problems with the girders and bridge deck. One option would be to fasten steel bridge decking to the bridge deck and fill with asphalt. The decking would be installed transverse to the bridge

span. Typically, 1 ½ inch decking can be used with a maximum of 4" total depth of asphalt. This would span the gaps in the girders and would help spread vehicle loads across the three girders. However, it would also add substantial weight to the bridge which reduces the vehicle load carrying capacity of the bridge.

If this option is selected, we recommend prohibiting truck traffic on the bridge. Only passenger vehicles with a maximum axle weight of 4,000 pounds or 2 tons should be allowed to use this bridge. This is equivalent to a maximum vehicle weight of 8,000 pounds or 4 tons. This limit is based on a load rating where several assumptions had to be made to allow for the unknown conditions such as the amount of prestress and remaining strength of the damaged concrete. Further restrictions should include a speed limit of 5 miles per hour and a limit of one vehicle on the bridge at a time. These restrictions should be clearly posted at each end of the bridge. We must emphasize that this option has inherent safety risks because of the approximations used in evaluating the condition and strength of the bridge and the substandard bridge railing.

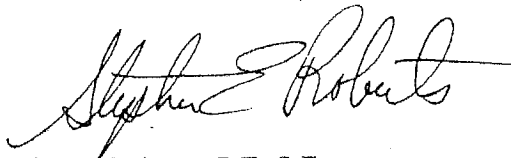
A third option would be to cover the gap between the girders by fastening a steel plate to the bridge deck. A high strength polymer overlay (approximately ½" thick) would be applied to the bridge deck. The advantage of this option is that the added dead load is much less than the asphalt overlay option. The same load restrictions and speed limit listed above would apply. However, this would result in a higher factor of safety for the vehicle loads.

In conclusion, it is our opinion that the two mitigation and weight restriction options will reduce the risks to the traveling public. However, we need to emphasize that because of the problems outlined above; the limited ability to inspect the critical elements of the bridge; and the approximate nature of the structural analysis, any option other than closing and replacing the bridge includes some safety risk to vehicles using the bridge. Ultimately, the bridge needs to be replaced. Therefore, we further recommend that the City take the steps necessary to replace the bridge as soon as possible.

We appreciate the opportunity to present this information to Coalville City. We would be glad to answer questions or provide additional information as needed. You can contact me at (435) 713-9514 or at sroberts@jub.com.

Sincerely,

J-U-B ENGINEERS, INC.



Steve Roberts, P.E. S.E.
Structures Group Manager

cc: Robert Whitely, J-U-B Engineers, Inc.

