

ADOPTED GOALS AND OBJECTIVES

Based on input received at public meetings, interviews, and the local knowledge of Advisory Committee members, the following goals and objectives were adopted to guide the work performed on this study.

GOALS

1. Maintain and enhance transportation capacity, safety and reliability for existing businesses, their employees, and all residents

2. Provide enhanced access for expansion and retention of new businesses, and attraction of new businesses to the region

3. Draw more traffic and commerce into the Upper Ohio Valley

4. Develop linkages to high capacity inter-modal transportation by strengthening the connections to river ports and railroads

5. Enhance emergency management options to provide alternative routes in case of flood, natural disaster or accident

6. Improve travel times throughout the region

7. Ensure that the cross-river transport network from Wheeling north to Steubenville is sufficiently robust to carry all weights and sizes of commercial vehicles

OBJECTIVES

Goal #1 - Maintain and enhance transportation capacity, safety and reliability for existing businesses, their employees, and all residents

- Provide alternative and redundant routes for truck traffic
- Alleviate congestion and maintain an acceptable minimum Level of Service (LOS) to enhance shipment of goods and movement of employees
- Accurately measure constraints of roadways and strive to upgrade river crossings and connecting roadways to at least current minimum standards for geometry

Goal #2 - Provide enhanced access for expansion and retention of businesses, and attraction of new businesses to the region

- Evaluate transportation improvements and alternatives for their ability to serve existing and potential future development sites
- Evaluate transportation improvements that can better tie together the BHJ region with adjacent economic market areas
- Prioritize improvements in transportation facilities and cross-river travel that can serve targeted economic development objectives for the BHJ region

- Goal #6 - Improve travel times throughout the region**
- Establish minimum desirable Levels of Service and adequate standards for roadway and bridge design
 - Establish time of travel as a critical planning criteria for prioritizing capital improvements

Goal #7 - Ensure that the cross-river transport network from Wheeling north to Steubenville is sufficiently robust to carry all weights and sizes of commercial vehicles

- Establish planning criteria for the larger tri-state region in concert with the states of Ohio, West Virginia, and Pennsylvania to ensure that improvements in the Steubenville-Weirton area help enhance and optimize the larger transportation network for all modes

Goal#3 - Draw more traffic and commerce into the Upper Ohio Valley

- Develop transportation system improvements that will provide greater interconnection with surrounding regions, states, municipalities, and marketplaces
- Build an efficient and effective transportation network that will become a regional strength and draw additional traffic and customers into the Steubenville-Weirton marketplace

Goal #4 - Develop linkages to high capacity inter-modal transportation by strengthening the connections to river ports and railroads

- Consider access to rail and river port facilities as a locational criteria for transportation improvements and cross-river travel routes

Goal #5 - Enhance Emergency Management Options to Provide Alternative Routes in Case of Flood, Natural Disaster or Accident

- Redundancy of the transportation network and cross-river linkages during times of accident, flooding or other natural disaster should be a planning criteria for new major investments in infrastructure
- Roadway design standards for new travel facilities should account for the weight and size of vehicles expected to travel during times of emergency and at all other times

BRIDGE CONDITION ANALYSIS

MARKET STREET BRIDGE

Description

The Market Street Bridge spans over the Ohio River at Steubenville, Ohio, and is approximately 1,800 feet long. The West Virginia Department of Transportation is responsible for maintaining the bridge. It consists of two girder-approach spans (32 feet each), three through-truss spans (12 feet each) and a suspension bridge (324 feet, 700 feet, 274 feet) to span over the main river channel. The cross-section includes a two-lane roadway and a pedestrian walkway. The roadway carries an average of 9,200 vehicles per day based on Ohio Department of Transportation traffic data. The west end of the bridge extends into downtown Steubenville.

History

The original structure was erected in 1904 and was designed to carry two lanes of traffic and/or trolleys. Several rehabilitation projects have occurred to the bridge during its history.

In 1941, the original timber deck was removed and replaced with a "Neeld" floor and steel plate sidewalk. In addition, the cable anchors were modified, the stiffening trusses were replaced, and the towers were reinforced as part of the rehabilitation.

In 1953, the Neeld floor system was replaced with a 5-inch, I-Beam-Lok (open grid-type) floor, and the truss system was strengthened.

In 1981, a \$5 million rehabilitation was performed on the Bridge. A new open-grid deck floor was installed, the majority of the floor stringers were replaced, floor beams were strengthened, a new roadway lighting system installed, and the entire Bridge was repainted. The cross bracing in the suspension span towers was also modified. Repairs to Pier Nos. 2, 3, and 4 were made as well as Bent Nos. 5, 6, and 7.

Condition Evaluation

The most recent inspection reports (1991 and 1995) were reviewed to determine the condition of the structure.

The Bridge is currently posted for 5 tons based upon information provided in the 1995 Interim Inspection Report. The 1981 rehabilitation increased the rating from 3 tons to 15 tons. At some point after the 1981 work, the Bridge was re-analyzed, and it was determined that the holes in the suspension span towers (to accommodate the pedestrian walkway) reduced the rating to its current 5 tons. This low posting limits the structure to automobile and light truck traffic.

The roadway width is 20'-8", which does not meet current roadway geometric standards for lane and shoulder requirements. Widening of the Bridge would not be feasible because of the width limitations imposed by the suspension span stiffening trusses.

The stringers and floor beams are in fair condition, a result of the open-grid deck permitting debris to accumulate on these members. The fracture-critical main cables rub against the stiffening trusses, resulting

those areas visible from the walkway. The following is a summary of that visit:

- The steel open-grid roadway deck is in good condition, although rounding of the skid-resistant grooves in the main support bars was noted.

- The hole in the main tower to permit pedestrian access, and which supposedly controls the structure rating, was viewed. It appears as though the hole is in the fascia plate only, which is connected with tack welds to the main tower columns.

- The main cables touch the stiffening truss at the main span centerline. Portions of the stiffening truss have been coped out to relieve interference.
- The paint system is in fair condition, although the primer is beginning to bleed through.

- A significant amount of automobile traffic was noted crossing the Bridge during the visit both into and out of Steubenville.

The pin-connected eyebars used for the stiffening truss bottom chords and the main cable anchorages exhibit pack rust and section loss.

Department of Transportation Survey

As part of this Study, Modjeski & Masters, Inc. contacted the West Virginia Department of Transportation to discuss the history, current condition, and future plans for the Market Street Bridge. District personnel confirmed the past work indicated above had been performed on the Bridge. They would like to increase the current posted rating from the current 5 tons to a 15-ton rating. Although no repair contracts have been planned for the immediate future, \$800,000 has been placed in a reserve account for renovation of the Bridge. It is anticipated that a contract would not be issued until at least 2003/2004. The Bridge is not considered historic, so funding is not available from that source.

As part of the Bridge assessment, a site visit was conducted on Tuesday, January 18, 2000, to gain familiarity with the structure prior to providing a summary on its condition. A brief meeting at Brooke-Hancock-Jefferson Metropolitan Planning Commission's (BHJ) offices was held with representatives from both the BHJ and the West Virginia Department of Transportation prior to the site visit to discuss the current condition of the Bridge. The Bridge was walked from end-to-end using the pedestrian walkway on the downstream side. Observations of the Bridge's existing condition were limited to

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Recommended Repairs

Significant rehabilitation of the existing structure would be required in order to meet today's traffic load demands. If rehabilitation were to be considered a viable alternative for the Bridge, the following items, at a minimum, would be included:

- Strengthen the suspension span towers to increase the Bridge's rating to 15 tons.
- Repair welded details used for previous repairs.
- Remove pack rust and repaint the towers.
- Strengthen to permit emergency vehicles (for example, fire trucks) to safely cross the structure.

As part of this Phase One Study, a cost estimate was developed based upon the repairs noted above. These cost estimates were based upon information provided in the inspection reports and the Department survey only. Contract plans were not available for determining repair quantities. This estimate is based solely on the limited sketches and photographs provided in the inspection reports. The costs included in this estimate are based upon repairs that will extend the service life of the Bridge minimally. Its load-carrying capacity will be slightly improved, but the deficient roadway geometrics will not be improved. The estimated cost of maintenance rehabilitation for the Market Street Bridge is \$5.6 million. A detailed cost estimate is included in the Appendix of this report.

Summary

Given the age of the Market Street Bridge, the remaining service life is nearing its end. Rehabilitation will slow its rate of deterioration, but the Bridge will remain deficient in terms of both roadway geometrics and load-carrying capacity. With a structure of this type and age, concerns will continue to exist over the integrity of the main cables, cable anchorages and the supporting piers. The costs included in the estimate do not account for these unknowns. The current funding reserve for future repairs will not be sufficient to extend its service life for the long-term. The Owner will have difficulty securing additional repair funds, given the age, condition and structural capacity of the Bridge.

- Retrofit suspected fatigue-prone field welds used on the stiffening trusses during previous renovations.
- Retrofit the stiffening truss to eliminate interference with the main cables.
- Inspect and repair main cable and suspender ropes. Clean and re-caulk cable bands.
- Contain, clean, prime and repaint the (suspected) lead-based paint system on the towers and superstructure.
- Perform concrete repairs (shotcrete/epoxy injection) to Abutment No. 2 and the Ohio Anchorage.

FORT STEUBEN BRIDGE

Description

The Fort Steuben Bridge spans over the Ohio River just north of Steubenville, Ohio, and is approximately 1,585 feet long. The Ohio Department of Transportation is responsible for maintenance of the structure. It consists of four-deck girder approach spans (60 to 90 feet in length each) and a suspension bridge (283-, 688- and 283-foot spans) that crosses over the main river channel. The cross-section includes two traffic lanes and a pedestrian walkway. The roadway carries an average of 6,000 vehicles per day (1996), of which approximately 17% is heavy truck traffic.

The original structure was erected in 1928.

History

In 1972, the Bridge underwent a major rehabilitation during which many fatigue-prone weld details were used to connect strengthening plates to various truss chords and diagonals. Review of inspection reports indicates that no cracks were found in the welds, strengthening plates, or base metal of any of the fatigue-prone details, with the exception of the suspender rope protection beams. It is suspected that the repaired members were in service (under load) when the strengthening plates were added.

In addition, the deck was replaced with a 4-1/4-inch concrete-filled steel-grid deck. In order to accommodate the new deck, the existing stringers were re-spaced, and a new centerline stringer was added. During this time, the superstructure was painted.

In 1986, the entire structure was painted again, and in 1996, the cable-related portions, which include the main suspension cables, suspenders, spreader brackets, and suspender sockets, were painted.

In 1992, a high performance rubberized asphalt wearing surface was installed.

In 1998, emergency repairs were performed to the approach girder bearings.

Condition Evaluation

Currently, this structure is appraised to be in poor condition. Deterioration of the suspension-span stringers, caused by leaking deck deflection joints, governs the appraisal rating. The Level of Service is low because of the narrow roadway and the fact that the bridge terminates into a T-intersection on the Ohio side of the structure.

The bridge is currently not posted, but is limited to 100-percent of the Ohio legal loads at the operating level of stress. Permit loads are not permitted on the structure.

The wearing surface of the suspended span is in poor condition and requires resurfacing. Inadequate stiffening of the steel grid and patching of holes was indicated in the inspection reports. Other floor system components, which include the concrete-filled grid deck, curbs, sidewalk, railing, deck joints and drainage scuppers, are in fair to good condition with some deficiencies. The original stringers that were repositioned resulted in additional holes in the floorbeams, thus