Bill Burton Fishing Pier
Trappe, Maryland
Rehabilitation / Replacement Recommendations
April 2022

EBA Engineering, Inc.
6100 Chevy Chase Drive, Suite 200
Laurel, Maryland 20707

EBA ENGINEERING | *where commitment counts*

Preamble

This report is an executive summary of the inspection findings and recommendations related to the rehabilitation / replacement of the Bill Burton Fishing Pier. Every effort was made to keep this concise and to the point. If additional information or clarification is required, we refer the reader to the most recent inspection reports and site photos. As is often said, "a picture is worth a thousand words," so we will rely more on pictures than words. The pictures on pages 5 through 12 depict the observed deterioration in structural bridge elements.

Introduction

The Maryland Department of General Services commissioned EBA Engineering, Inc. (EBA) to assess the superstructure and substructure of the Bill Burton Fishing Pier Bridge. EBA inspected the bridge in May/June 2021 for portions of the structure above water. Due to severe deterioration observed near the waterline, it was necessary to perform a limited underwater inspection of select substructure units from the waterline to the riverbed. EBA retained Marine Solutions, Inc. (Marine Solutions) to perform this limited underwater inspection. The limited/modified underwater inspection was conducted in February 2022. It involved a Level I Inspection of 32 bents out of the bridge's 151 bents (approximately 20%), a Level II inspection (including cleaning three 12" high bands near the splash zone, at mid-height, and near the mudline to observe conditions) of 32 piles, and documenting water depth measurements at both ends of each bent. The inspection goals were to document the existing structural condition of the bents and piles mentioned above and assess overall site conditions.

Findings of previous inspections were given due consideration while making recommendations for future actions related to this facility.

Description of the Facility

The Bill Burton Fishing Pier was originally constructed in 1935 as the Emerson C. Harrington Bridge. The original bridge was approximately 2 miles long and spanned the Choptank River to connect the towns of Trappe and Cambridge. Due to increased traffic demands, the four-lane Frederick C. Mulkus Bridge was constructed in 1987, adjacent to the original bridge, which became the current Route 50 bridge. The drawbridge section of the old bridge was removed to allow vessel traffic passage. The structure was also converted into a pedestrian fishing pier, and the name was later changed to honor Bill Burton, a local fisherman, writer, and reporter.

The Bill Burton Fishing Pier is comprised of two separate structures. The south structure is approximately 3,000 feet long, supported by 56 bents. The north structure is approximately 5,000 feet long, supported by 95 bents. The bents are typically comprised of 5 square reinforced concrete piles with a horizontal concrete strut that encompasses all five piles. The struts generally are located 4' below the top of the piles within the tidal zone. Several bents appear to have had the strut removed and pile jackets installed. There is a 10-pile double bent with a reinforced concrete strut at approximately every eighth bent.

Assessment

Using FHWA's "Recording and Coding Guide for Structure Inventory and Appraisal of the Nation's Bridges" (Report No. FHWA-PD-96-001), the Bill Burton Fishing Pier is assigned a combined overall Condition Rating based on the type and level of severity of deterioration observed on the individual structural components of each structure. Recommendations are provided based on the facility's current condition, redundancy of structural elements, known history and age, results of previous inspections, and the most recent modified underwater inspection. An excerpt of the FHWA's bridge condition rating criteria is provided on page 18 in Appendix B.

Condition Assessment Rating

The Bill Burton Fishing Pier is in overall **Serious condition** (Condition Rating 3) to **Critical** condition (Condition Rating 2). This assigned Condition Rating is due to widespread areas of **advanced deterioration** and isolated areas of **severe deterioration** of the primary structural elements. As noted in the attached FHWA guideline, for the "Critical" condition rating, "Unless closely monitored, it may be necessary to close the bridge until corrective action is taken."

Recommendations

EBA's development of recommendations for additional actions and rehabilitation to various structural elements of the Bill Burton Fishing Pier focused on determining the most efficient and cost-effective use of funds. In addition, due consideration was given to life-cycle cost and benefit-cost aspects, as total costs encompass **both** the upfront investments **and** those required for recurring maintenance over the anticipated service life of the structure.

Marine Solutions' limited underwater inspection of February 2022 confirmed our suspicion of **crumbling concrete** in many areas of the structure below the water surface (see photos 12 thru 17). We believe this condition is prevalent throughout the structure. These defects can cause **sudden failures**, often with little to no warning, making them unpredictable. In addition, they are very costly to repair due to the need for special underwater construction methods and materials and limiting environmental regulations for construction work in water.

Repair/Replacement Options

1. **Repair Existing Bridge:**

   The repair cost estimate of approximately $25 million provided by Kumi Construction Management Corp. (KUMI) in September 2021 did not include underwater repairs. Our initial estimate of underwater repairs is approximately $15 to $20 million, which would result in a total bridge repair cost of approximately $40 to $45 million.

2. **Construct New Bridge:**

   Construction of a new fishing pier, approximately 1,500 feet long on each side of the river, will require additional study to determine the best-suited and most economical structure type for this location and application. However, one structure type that could meet the requirements is shown in the sketch on page 14 (Appendix A). Our preliminary estimate indicates that the cost of such a structure would be far less than for the repair of the existing bridge. To confirm this, we need to perform a limited preliminary structure type study and retain KUMI's services for cost estimation.

An accurate cost comparison between fixing the old bridge versus building a new fishing pier will require the following additional considerations:

a. Including the cost of demolishing the existing structure to option 2 above.

b. Comparing the life cycle cost of options 1 and 2 above. This analysis would include consideration of the required regular inspections and maintenance costs for the existing structure versus the minimal maintenance needs (15-plus years) and the much longer service life (50-plus years) of a new structure.

c. Because a new structure would have a much longer service life than the repaired existing structure, a time-dependent life cycle cost-benefit analysis would need to be performed to compare the two options equitably.

Conclusion

We await direction from the Maryland Department of General Services for the next steps. We are available to meet and discuss further at the convenience of the Department.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

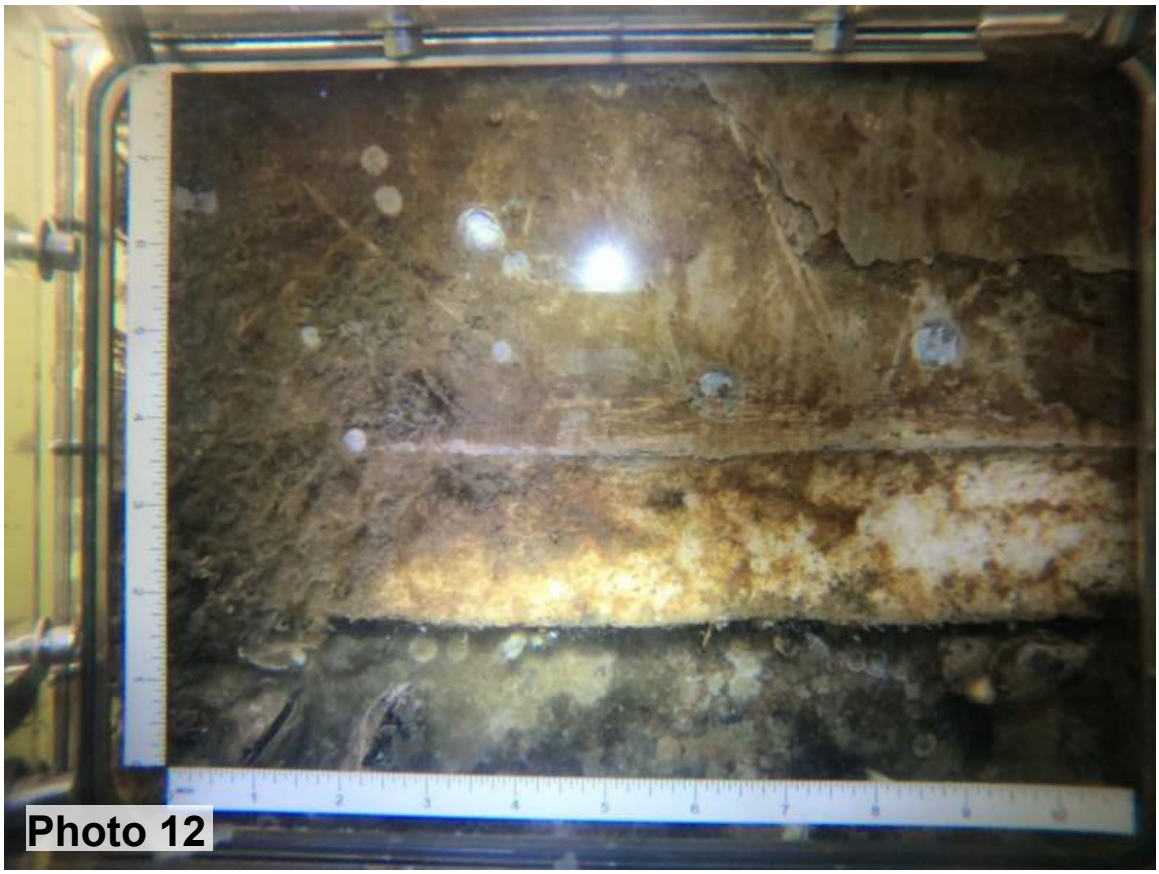


Photo 12

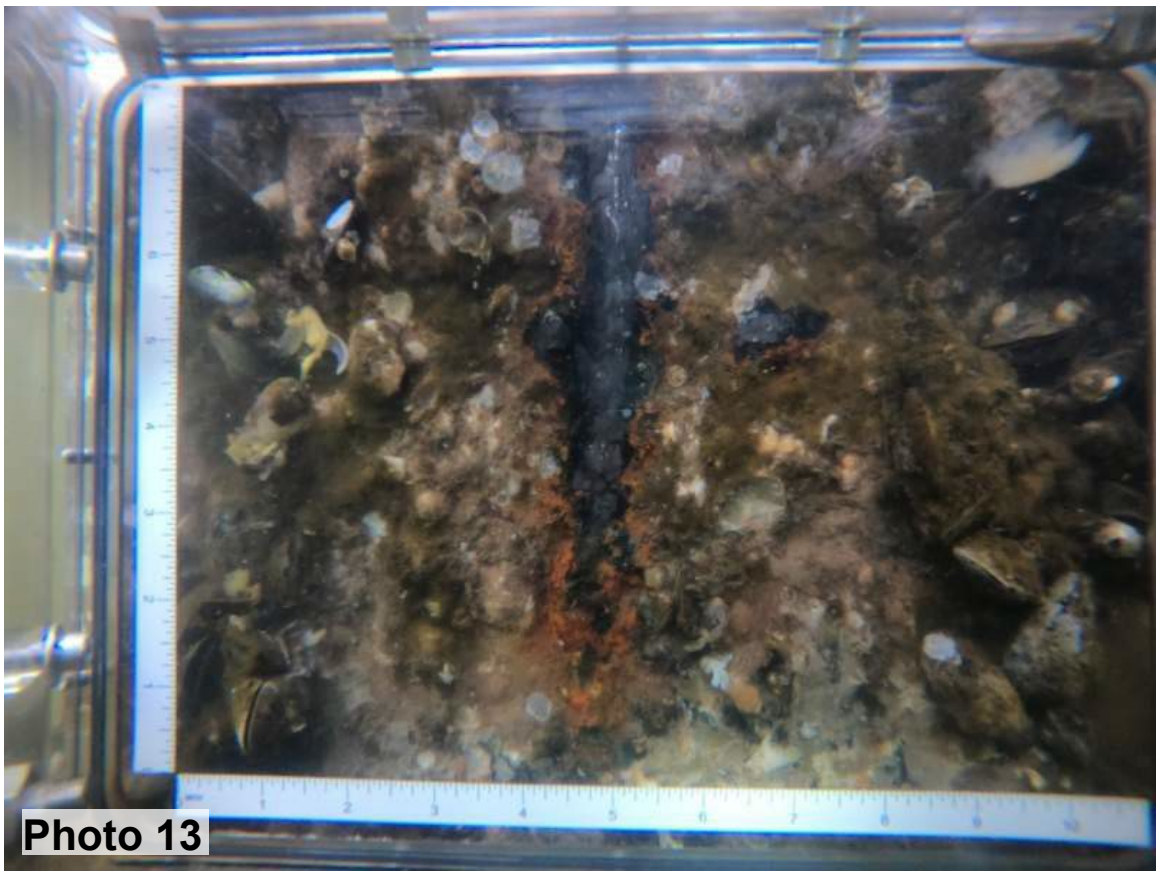


Photo 13

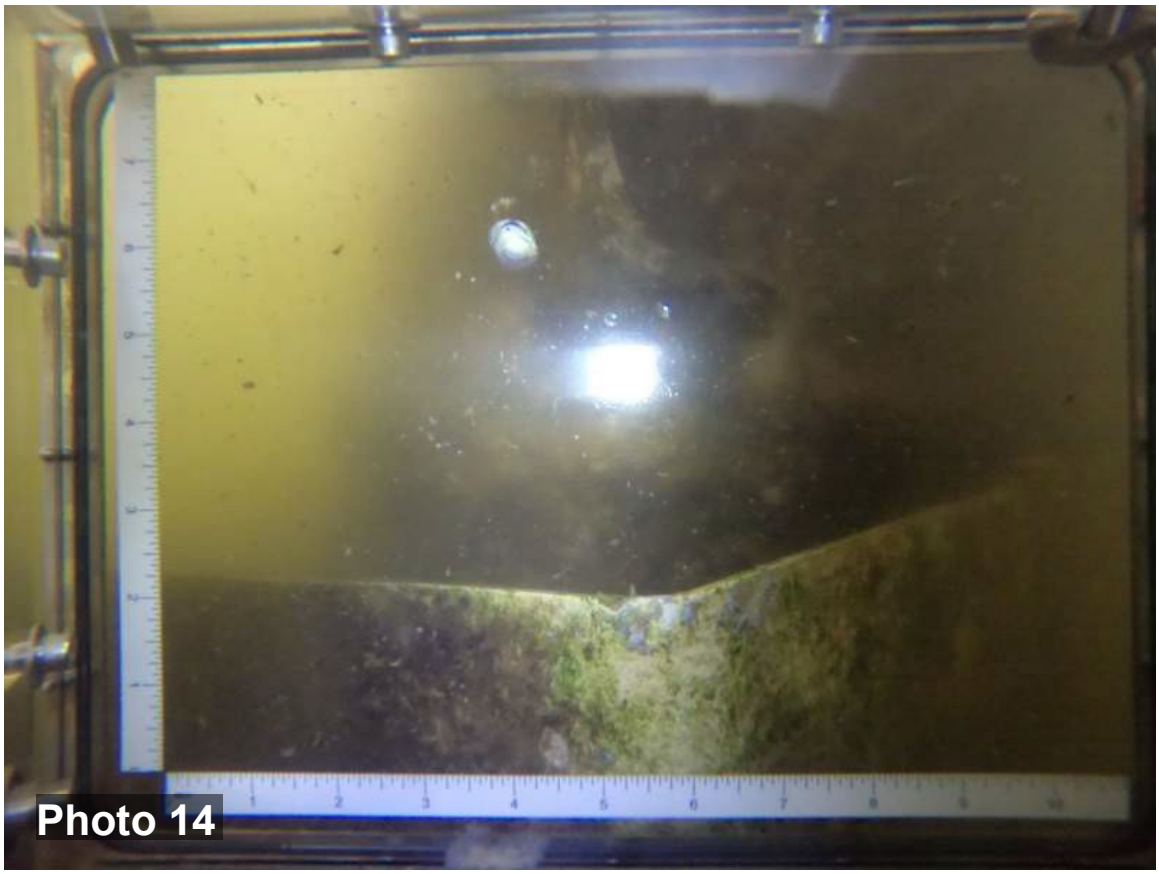


Photo 14

Photo 15

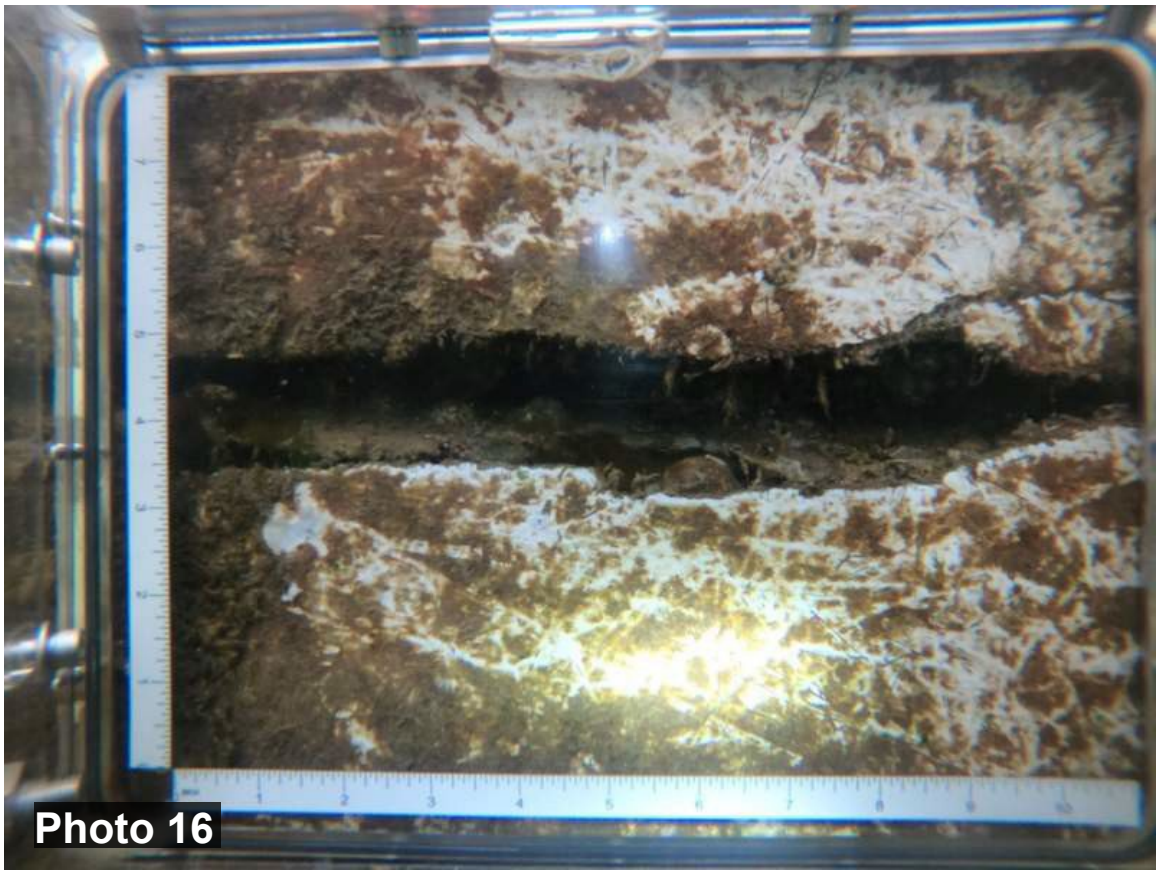
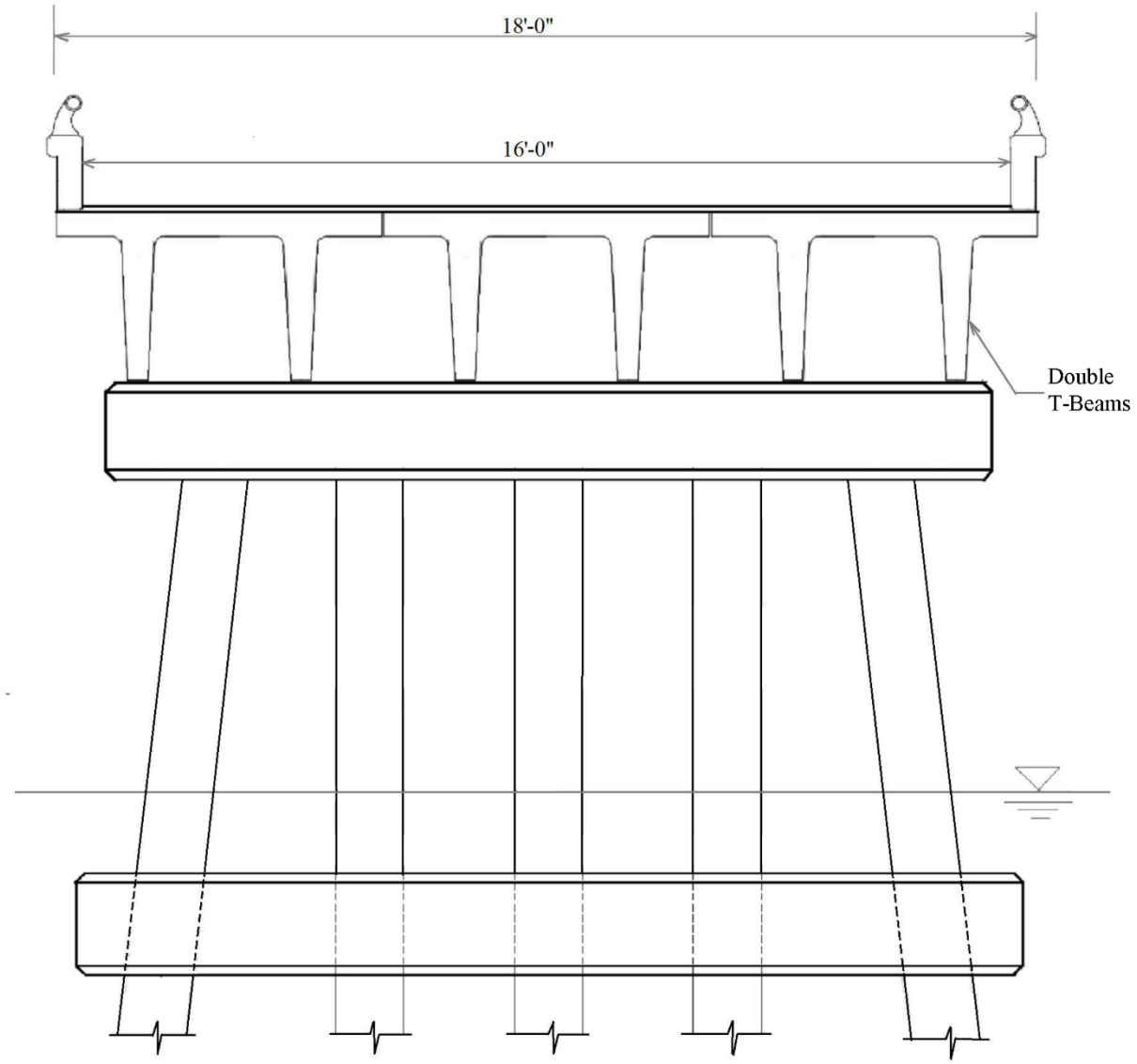


Photo 16

Photo 17

Appendix A

Proposed Bridge Sketch



Proposed Bridge - Typical Section

Appendix B

FHWA Bridge Condition Assessment Criteria

U.S. Department
of Transportation
Federal Highway Administration

Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges

Report No. FHWA-PD-96-001

Office of Engineering
Bridge Division

December 1995

Item 56 - Minimum Lateral Underclearance on Left 3 digits
(XX.X meters) (code only for divided highways, 1-way streets, and ramps; not applicable to railroads)

Using a 3-digit number, record and code the minimum lateral under-clearance on the left (median side for divided highways) to the nearest tenth of a meter (with an assumed decimal point). The lateral clearance should be measured from the left edge of the roadway (excluding shoulders) to the nearest substructure unit, to a rigid barrier, or to the toe of slope steeper than 1 to 3. Refer to examples on page 34 under Item 55 - Minimum Lateral Underclearance on Right.

In the case of a dual highway, the median side clearances of both roadways should be measured and the smaller distance recorded and coded. If there is no obstruction in the median area, a notation of "open" should be recorded and 999 should be coded. For clearances greater than 30 meters, code 998. Coding of actual clearances greater than 30 meters to an exact measurement is optional. Code 000 to indicate not applicable.

Item 57

(Reserved)

Items 58 through 62 - Indicate the Condition Ratings

In order to promote uniformity between bridge inspectors, these guidelines will be used to rate and code Items 58, 59, 60, 61, and 62. The use of the AASHTO Guide for Commonly Recognized (CoRe) Structural Elements is an acceptable alternative to using these rating guidelines for Items 58, 59, 60, and 62, provided the FHWA translator computer program is used to convert the inspection data to NBI condition ratings for NBI data submittal.

Condition ratings are used to describe the existing, in-place bridge as compared to the as-built condition. Evaluation is for the materials related, physical condition of the deck, superstructure, and substructure components of a bridge. The condition evaluation of channels and channel protection and culverts is also included. Condition codes are properly used when they provide an overall characterization of the general condition of the entire component being rated. Conversely, they are improperly used if they attempt to describe localized or nominally occurring instances of deterioration or disrepair. Correct assignment of a condition code must, therefore, consider both the severity of the deterioration or disrepair and the extent to which it is widespread throughout the component being rated.

The load-carrying capacity will not be used in evaluating condition items. The fact that a bridge was designed for less than current legal loads and may be posted shall have no influence upon condition ratings.

Portions of bridges that are being supported or strengthened by temporary members will be rated based on their actual condition; that is, the temporary members are not considered in the rating of the item. (See Item 103 - Temporary Structure Designation for the definition of a temporary bridge.)

Completed bridges not yet opened to traffic, if rated, shall be coded as if open to traffic

Condition Ratings (cont'd)

The following general condition ratings shall be used as a guide in evaluating Items 58, 59, and 60:

Code	Description
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION - no problems noted.
7	GOOD CONDITION - some minor problems.
6	SATISFACTORY CONDITION - structural elements show some minor deterioration.
5	FAIR CONDITION - all primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
4	POOR CONDITION - advanced section loss, deterioration, spalling or scour.
3	SERIOUS CONDITION - loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	"IMMINENT" FAILURE CONDITION - major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	FAILED CONDITION - out of service - beyond corrective action.

Item 58 - Deck 1 digit

This item describes the overall condition rating of the deck. Rate and code the condition in accordance with the above general condition ratings. Code N for culverts and other structures without decks e.g., filled arch bridge.

Concrete decks should be inspected for cracking, scaling, spalling, leaching, chloride contamination, potholing, delamination, and full or partial depth failures. Steel grid decks should be inspected for broken welds, broken grids, section loss, and growth of filled grids from corrosion. Timber decks should be inspected for splitting, crushing, fastener failure, and deterioration from rot.

The condition of the wearing surface/protective system, joints, expansion devices, curbs, sidewalks, parapets, fascias, bridge rail, and scuppers shall not be considered in the overall deck evaluation. However, their condition should be noted on the inspection form.