THE Swift Staley TEAM

DOE Contract No. DE-EM0003733
SST-19-9007

January 22, 2019

Ms. Jennifer Stokes, Contracting Officer
Portsmouth/Paducah Project Office
U.S. Department of Energy
1017 Majestic Drive, Suite 200
Lexington, KY 40513

**DE-EM0003733: Deliverable 118, Big Bayou Creek Railroad Bridge Annual Inspection Report**

Dear Ms. Stokes:

Enclosed for your information is the annual inspection report for the Big Bayou Creek Railroad Bridge in accordance with C.3.5.8.3.1, *Railroad Preventive Maintenance Inspection.*

If you have questions, please contact Stacey Marinelli, Engineering and Assets Manager, at (270) 441-6414.

Sincerely,

Tammy Courtney

Tammy Courtney
Project Manager

TC:SM:jlb

e-copy: J. Bradley
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DOE Support
T. Duncan, PPPO/PAD
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SST RMC/RC

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

# BRIDGE INSPECTION REPORT FOR C-1930 BIG BAYOU CREEK RR BRIDGE

**PREPARED FOR:** Swift & Staley Inc.

**STRUCTURE NUMBER:** C-1930

**TEAM LEAD:** Chris Vollmer, PE

**DATE INSPECTED:** January 15, 2019

STATE OF KENTUCKY
Christopher M Vollmer
No. 28615
LICENSED PROFESSIONAL ENGINEER
1/17/2019

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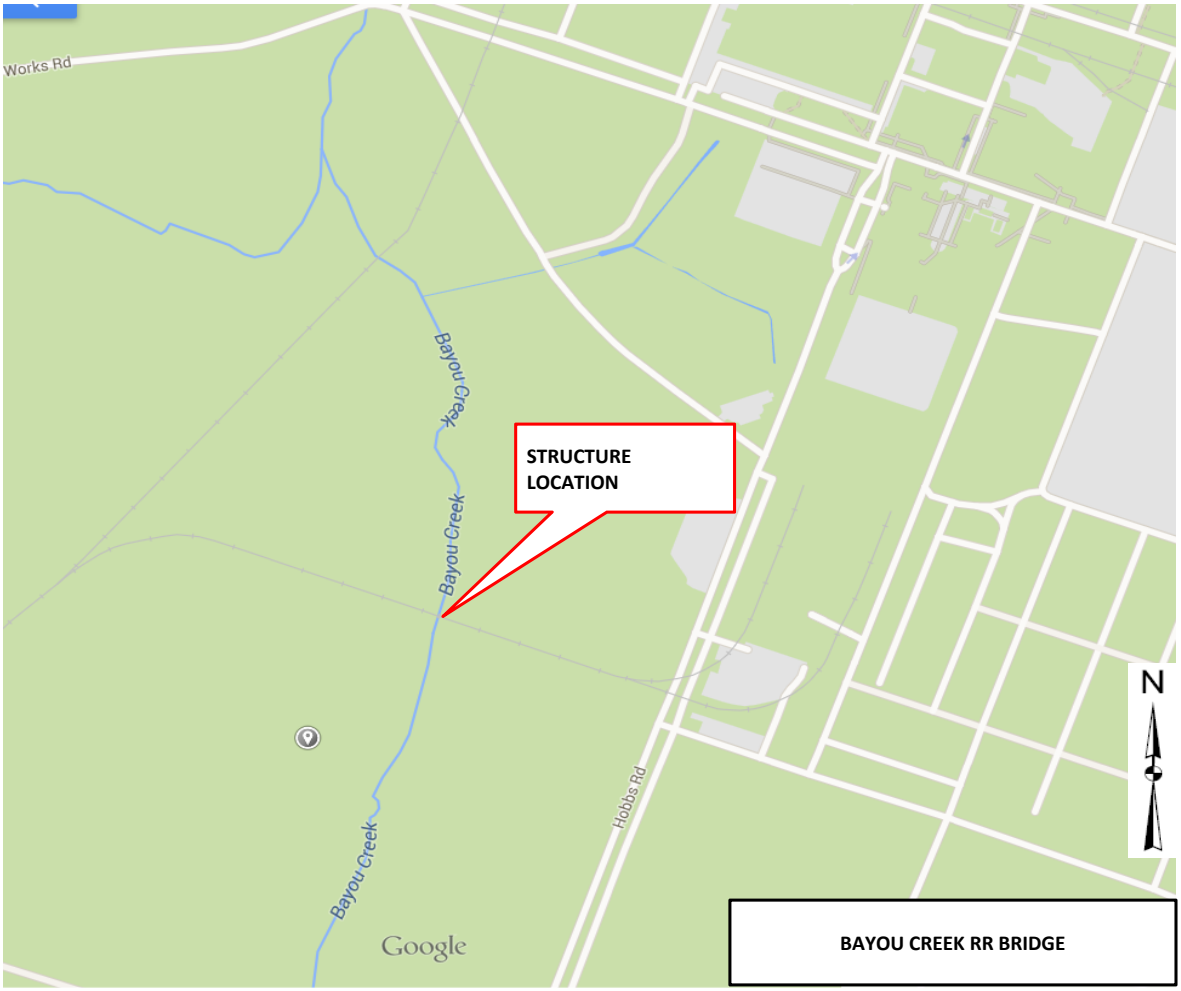



**LOCATION MAP**

# BRIDGE INSPECTION REPORT

| | |
|---|---|
| Structure No. | C-1930 |
| Bridge Description | 57' Steel through girder bridge with open grid steel deck |
| Location: | DUF6 RR over Bayou Creek |

Inspector' Signature: [signature] Date: 1/17/2019

| 31 | Design Load | 16 |
|---|---|---|
| | Cooper E-80 | |

| 41 | Status | 1 |
|---|---|---|
| | Open, No Restrictions | |

| 58 | DECK | 7 |
|---|---|---|
| a. | Structural Condition | 7 |
| b. | Wearing Surface | N/A |
| c. | Joints | N/A |
| d. | Drains | N/A |
| e. | Expansion Devices | N/A |
| f. | Curbs, Sidewalks, Medians | N/A |
| g. | Railings | N/A |
| h. | Lighting and Utilities | N/A |

| 59 | SUPERSTRUCTURE | 7 |
|---|---|---|
| a. | Stringers, Girders, Beams | 7 |
| b. | Floor Beams | 7 |
| c. | Trusses-Main Members | N/A |
| d. | Bearing Devices | 7 |
| e. | Alignment/Structural Members | 7 |
| f. | Deflection/Vibration Under Load | 7 |
| g. | Debris on Members | 7 |

| 59A Paint Condition | | | |
|---|---|---|---|
| Color: | Green | Date Painted: | 2006 |

| 60 | Substructure | 7 |
|---|---|---|
| a. | Abutments/Wingwalls | 7 |
| b. | Pier/Bents | N/A |
| c. | Alignment/Settling | 7 |
| d. | Scour, Erosions | 8 |
| e. | Debris on Seats, Caps | 7 |
| f. | Protection System | N/A |

| | |
|---|---|
| LAT: | 37.1055 |
| LONG: | 88.8218 |

| 61 | Channel/Channel Protection | 7 |
|---|---|---|
| a. | Channel Scour | 8 |
| b. | Embankment Erosion | 7 |
| c. | Drift | 8 |
| d. | Channel Alignment | 7 |
| e. | Vegetation | 8 |
| f. | Erosion Control System | 8 |
| g. | Rip-Rap | N/A |
| | | |

| 62 | Culvert-Retaining Walls | N/A |
|---|---|---|
| a. | Barrel | N/A |
| b. | Wingwalls, Headwall | N/A |
| c. | Debris | N/A |
| d. | Scour Under Footings | N/A |
| e. | Erosion at Wingwalls | N/A |
| f. | Drainage Adequacy | N/A |

| | | |
|---|---|---|
| 63 | Method used to determine Operating Rating | 1 |
| 64 | Operating Rating | 1.46 |

| | | |
|---|---|---|
| 65 | Method used to determine Inventory Rating | 1 |
| 66 | Operating Rating | 1.02 |

| | | |
|---|---|---|
| 70 | Bridge Posting | 5 |

| | | |
|---|---|---|
| 71 | Waterway Adequacy | 7 |
| 72 | Approach Roadway Alignment | N/A |

| | | |
|---|---|---|
| 113 | Scour Critical Bridge Rating | 8 |

| 108 | Wearing Surface/Protective Syst. | |
|---|---|---|
| | Type | N/A |
| | Membrane | N/A |
| | Protection | N/A |

| | | | |
|---|---|---|---|
| Overlay: | Yes | No X | |
| Date : | Unknown | | |
| Type: | Latex: | PCC: | Asphalt: |
| Depth: | | | |

## Physical Description of Structure:

The structure is a 57' simple span, steel through girder structure with an open steel grid deck on steel floor beams. The substructure consists of closed reinforced concrete abutments.

## Field Inspection & Physical Evaluation:

The bridge was visually inspected by personnel from Bacon Farmer Workman Engineering and Testing, Inc. on January 15th, 2019. The following is a description and notes pertaining to the items recorded in the bridge inspection report.

**Item 58-Deck**

| | |
|---|---|
| a. | Structural Condition |
| | Steel bridge deck is in good condition. The deck is tightly secured to floor beams with only minor surface rust noted. |

**Item 59-Superstructures**

| | |
|---|---|
| a. | Stringers, Girders, Beams |
| | The steel girders and floor beams are in good condition with only minor surface rust noted. |
| d. | Bearing Devices |
| | Elastomeric bearings are in good condition with only minor surface rust noted. |
| e. | Alignment/Structural Members |
| | The alignment of structural members is in good condition. |
| f. | Deflection/Vibration Under Load |
| | No excessive deflection or vibration observed. |
| g. | Debris on Members |
| | A minor amount of debris on superstructure members noted. |

**Item 59a-Paint Condition**

The paint is in good condition, with minor surface oxidation and flaking observed.

**Item 60-Substructure**

| | |
|---|---|
| a. | Abutments/Wingwalls |
| | The abutments and wingwalls are in good condition. Minor cracking, efflorescence, and honeycombed areas throughout the abutments was noted. |
| c. | Alignment/Settling |
| | No alignment or settling issues noted. |
| d. | Scour, Erosions |
| | No scour or erosion problems noted. |
| e. | Debris on Seats, Caps |
| | Minor amount of debris on abutment seats. |

**Item 61-Channel and Channel Protection**

| | |
|---|---|
| a. | Channel Scour |
| | No channel scour noted. |
| b. | Embankment Erosion |
| | There is some minor erosion of stream banks. Upstream and downstream banks are beginning to slump. |
| c. | Drift |
| | Trees are down and located near the west bank, south of the bridge. |
| d. | Channel Alignment |
| | Channel alignment is good. |
| e. | Vegetation |
| | Light vegetation growing near the abutment wingwalls. The banks are well vegetated. |

**Item 71-Waterway Adequacy**

Railroad approaches are above flood water elevations (high water). Chance of overtopping is remote.

**Item 113-Scour Critical Bridge**

Item 113 is coded as 8. A scour analysis report was submitted in June 2018 and indicates that the bridge foundation is stable for the calculated scour conditions.

## Discussion and Recommendations

The bridge is in good condition. The missing deck to floor beam connection noted in previous reports has been repaired. The sag in the track just behind the East Abutment noted in previous reports has been repaired but is beginning to sag again. This portion of the railroad tracks is expected to be repaired during the next round of routine track maintenance.

It is also recommended that the bridge be pressure washed periodically as part of general maintenance to prevent the buildup of debris and grit on the steel members. This will extend the life of the paint system and delay deterioration of the steel.

**Bridge looking upstream**

**Looking downstream**

**Bridge looking west**

**Looking upstream**

**Looking upstream from structure**

**Looking downstream from structure**

**Bridge looking east**

**Deck looking west**

**South Girder looking west**

**North Girder looking west**

**Bridge deck**

**East Abutment and wings**

**Northwest wing**

**Southwest wing**

**Northeast wing**

**Southeast wing**

**60 inch RCP upstream from bridge**

**Downed trees looking south**

**Typical Bearing Condition**

**Backwall at East Abutment**

**West Abutment**

**Undermining of concrete lining upstream**

**Undermining of concrete lining upstream**

**Undermining of concrete lining downstream**

**Typical rail leveling pad at East Abutment**

**Typical rail leveling pad at East Abutment**

**Typical rail leveling pad at East Abutment**

# APPENDIX

Inspector Certificate & Coding Guide

U.S. Department
Of Transportation
**Federal Highway Administration**

NATIONAL HIGHWAY INSTITUTE
*Training Solutions for Transportation Excellence*

## National Highway Institute

# *Certificate of Training*

# Christopher M. Vollmer

***has participated in***

## FHWA – NHI 130055

## Safety Inspection of In-Service Bridges

***hosted by***

## Illinois Department of Transportation

***Date:*** **March 23 – April 3, 2009**

***Location:*** **Springfield, Illinois**

***Hours of Instruction:*** **60**

**Instructor**

**Instructor**

**Local Coordinator**

**Richard Barnaby, Director**
**National Highway Institute**

Illinois Department of Transportation
Bureau of Bridges and Structures

# Illinois Department of Transportation

## AWARDS

**Chris Vollmer**

(Attendee Name)

## Professional Development Hours

**for attendance of:**

## *IDOT Bridge Inspection Calibration Class*

**March 12-13, 2014**

**Professional Development Hours – 11.5**

***Instructor: Mike Cima, PE, SE***
***Hampton, Lenzini, and Renwick, Inc.***

Illinois Department of Transportation
Bureau of Bridges and Structures

# Illinois Department of Transportation

## AWARDS

**Chris Vollmer**
(Attendee Name)

## Professional Development Hours

for attendance of:

# *IDOT Bridge Inspection Calibration Class*

**October 15th & 16th, 2018**

**Professional Development Hours – 12.0**

***Instructor: Mike Cima, PE, SE***
***Quigg Engineering, Inc.***

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**

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.

Item 58 - Deck (cont'd)

Decks integral with the superstructure will be rated as a deck only and not how they may influence the superstructure rating (for example, rigid frame, slab, deckgirder or T-beam, voided slab, box girder, etc.). Similarly, the superstructure of an integral deck-type bridge will not influence the deck rating.

Item 59 - Superstructure 1 digit

This item describes the physical condition of all structural members. Rate and code the condition in accordance with the previously described general condition ratings. Code N for all culverts.

The structural members should be inspected for signs of distress which may include cracking, deterioration, section loss, and malfunction and misalignment of bearings.

The condition of bearings, joints, paint system, etc. shall not be included in this rating, except in extreme situations, but should be noted on the inspection form.

On bridges where the deck is integral with the superstructure, the superstructure condition rating may be affected by the deck condition. The resultant superstructure condition rating may be lower than the deck condition rating where the girders have deteriorated or been damaged.

Fracture critical components should receive careful attention because failure could lead to collapse of a span or the bridge.

Item 60 - Substructure 1 digit

This item describes the physical condition of piers, abutments, piles, fenders, footings, or other components. Rate and code the condition in accordance with the previously described general condition ratings. Code N for all culverts.

All substructure elements should be inspected for visible signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage, and corrosion. The rating given by Item 113 - Scour Critical Bridges, may have a significant effect on Item 60 if scour has substantially affected the overall condition of the substructure.

The substructure condition rating shall be made independent of the deck and superstructure.

Integral-abutment wingwalls to the first construction or expansion joint shall be included in the evaluation. For non-integral superstructure and substructure units, the substructure shall be considered as the portion below the bearings. For structures where the substructure and superstructure are integral, the substructure shall be considered as the portion below the superstructure.

Item 61 - Channel and Channel Protection 1 digit

This item describes the physical conditions associated with the flow of water through the bridge such as stream stability and the condition of the channel, riprap, slope protection, or stream control devices including spur dikes. The inspector should be particularly concerned with visible signs of excessive water velocity which may affect undermining of slope protection, erosion of banks, and realignment of the stream which may result in immediate or potential problems. Accumulation of drift and debris on the superstructure and substructure should be noted on the inspection form but not included in the condition rating.

Rate and code the condition in accordance with the previously described general condition ratings and the following descriptive codes:

| Code | Description |
|---|---|
| N | Not applicable. Use when bridge is not over a waterway (channel). |
| 9 | There are no noticeable or noteworthy deficiencies which affect the condition of the channel. |
| 8 | Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition. |
| 7 | Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift. |
| 6 | Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the channel slightly. |
| 5 | Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel. |
| 4 | Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel. |
| 3 | Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the channel to now threaten the bridge and/or approach roadway. |
| 2 | The channel has changed to the extent the bridge is near a state of collapse. |
| 1 | Bridge closed because of channel failure. Corrective action may put back in light service. |
| 0 | Bridge closed because of channel failure. Replacement necessary. |

Item 62 - Culverts 1 digit

This item evaluates the alignment, settlement, joints, structural condition, scour, and other items associated with culverts. The rating code is intended to be an overall condition evaluation of the culvert. Integral wingwalls to the first construction or expansion joint shall be included in the evaluation. For a detailed discussion regarding the inspection and rating of culverts, consult Report No. FHWA-IP-86-2, Culvert Inspection Manual, July 1986.

Item 58 - Deck, Item 59 - Superstructure, and Item 60 - Substructure shall be coded N for all culverts.

Rate and code the condition in accordance with the previously described general condition ratings and the following descriptive codes:

| Code | Description |
|---|---|
| N | Not applicable. Use if structure is not a culvert. |
| 9 | No deficiencies. |
| 8 | No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused by drift. |
| 7 | Shrinkage cracks, light scaling, and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting. |
| 6 | Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting. |
| 5 | Moderate to major deterioration or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting. |
| 4 | Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joint permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting. |

(codes continued on the next page)

Item 62 - Culverts (cont'd)

3 Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.

2 Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.

1 Bridge closed. Corrective action may put back in light service.

0 Bridge closed. Replacement necessary.

Item 63 - Method Used to Determine Operating Rating 1 digit

Use one of the codes below to indicate which load rating method was used to determine the Operating Rating coded in Item 64 for this structure.

| Code | Description |
|---|---|
| 1 | Load Factor (LF) |
| 2 | Allowable Stress (AS) |
| 3 | Load and Resistance Factor (LRFR) |
| 4 | Load Testing |
| 5 | No rating analysis performed |

Items 67, 68, 69, 71, and 72 - Indicate the Appraisal Ratings

The items in the Appraisal Section are used to evaluate a bridge in relation to the level of service which it provides on the highway system of which it is a part. The structure will be compared to a new one which is built to current standards for that particular type of road as further defined in this section except for Item 72 - Approach Roadway Alignment. See Item 72 for special criteria for rating that item.

Items 67, 68, 69, 71, and 72 will be coded with a 1-digit code that indicates the appraisal rating for the item. The ratings and codes are as follows:

| Code | Description |
|---|---|
| N | Not applicable |
| 9 | Superior to present desirable criteria |
| 8 | Equal to present desirable criteria |
| 7 | Better than present minimum criteria |
| 6 | Equal to present minimum criteria |
| 5 | Somewhat better than minimum adequacy to tolerate being left in place as is |
| 4 | Meets minimum tolerable limits to be left in place as is |
| 3 | Basically intolerable requiring high priority of corrective action |
| 2 | Basically intolerable requiring high priority of replacement |
| 1 | This value of rating code not used |
| 0 | Bridge closed |

The FHWA Edit/Update computer program calculates values for Items 67, 68 and 69 according to the tables provided in this manual. These tables and the table for Item 71 shall be used by all evaluators to rate these items. They have been developed to closely match the descriptions for the appraisal evaluation codes of 0 to 9. The tables shall be used in all instances to evaluate the item based on the designated data in the inventory, even if a table value does not appear to match the descriptive codes. For unusual cases where the site data does not exactly agree with the table criteria, use the most appropriate table to evaluate the item. The code of N is not valid for use with Items 67 and 72.

Completed bridges not yet opened to traffic, if rated, shall be appraised as if open to traffic. Design values, for example ADT, shall be used for the evaluation. The data provided will include a code of G for Item 41 - Structure Open, Posted, or Closed to Traffic.

Item 71 - Waterway Adequacy 1 digit

This item appraises the waterway opening with respect to passage of flow through the bridge. The following codes shall be used in evaluating waterway adequacy (interpolate where appropriate). Site conditions may warrant somewhat higher or lower ratings than indicated by the table (e.g., flooding of an urban area due to a restricted bridge opening).

Where overtopping frequency information is available, the descriptions given in the table for chance of overtopping mean the following:

| | | |
|---|---|---|
| Remote | - | greater than 100 years |
| Slight | - | 11 to 100 years |
| Occasional | - | 3 to 10 years |
| Frequent | - | less than 3 years |

Adjectives describing traffic delays mean the following:

| | | |
|---|---|---|
| Insignificant | - | Minor inconvenience. Highway passable in a matter of hours. |
| Significant | - | Traffic delays of up to several days. |
| Severe | - | Long term delays to traffic with resulting hardship. |

Functional Classification

| Principal Arterials - Interstates, Freeways, or Expressways | Other Principal and Minor Arterials and Major Collectors | Minor Collectors, Locals | Description Code |
|---|---|---|---|
| N | N | N | Bridge not over a waterway. |
| 9 | 9 | 9 | Bridge deck and roadway approaches above flood water elevations (high water). Chance of overtopping is remote. |
| 8 | 8 | 8 | Bridge deck above roadway approaches. Slight chance of overtopping roadway approaches. |
| 6 | 6 | 7 | Slight chance of overtopping bridge deck and roadway approaches. |
| 4 | 5 | 6 | Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays. |

(codes continued on the next page)

Item 71 - Waterway Adequacy (cont'd)

| Functional Classification | | | |
|---|---|---|---|
| Principal Arterials - Interstates, Freeways, or Expressways | Other Principal and Minor Arterials and Major Collectors | Minor Collectors, Locals | Description Code |
| 3 | 4 | 5 | Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with significant traffic delays. |
| 2 | 3 | 4 | Occasional overtopping of bridge deck and roadway approaches with significant traffic delays. |
| 2 | 2 | 3 | Frequent overtopping of bridge deck and roadway approaches with significant traffic delays. |
| 2 | 2 | 2 | Occasional or frequent overtopping of bridge deck and roadway approaches with severe traffic delays. |
| 0 | 0 | 0 | Bridge closed. |

Item 72 - Approach Roadway Alignment 1 digit

Code the rating based on the adequacy of the approach roadway alignment. This item identifies those bridges which do not function properly or adequately due to the alignment of the approaches. It is not intended that the approach roadway alignment be compared to current standards but rather to the existing highway alignment. This concept differs from other appraisal evaluations. The establishment of set criteria to be used at all bridge sites is not appropriate for this item. The basic criteria is how the alignment of the roadway approaches to the bridge relate to the general highway alignment for the section of highway the bridge is on.

The individual structure shall be rated in accordance with the general appraisal rating guide described on page 453 in lieu of specific design values. The approach roadway alignment will be rated intolerable (a code of 3 or less) only if the horizontal or vertical curvature requires a substantial reduction in the vehicle operating speed from that on the highway section. A very minor speed reduction will be rated a 6, and when a speed reduction is not required, the appraisal code will be an 8. Additional codes may be selected between these general values.

Item 72 - Approach Roadway Alignment (cont'd)

For example, if the highway section requires a substantial speed reduction due to vertical or horizontal alignment, and the roadway approach to the bridge requires only a very minor additional speed reduction at the bridge, the appropriate code would be a 6. This concept shall be used at each bridge site.

Speed reductions necessary because of structure width and not alignment shall not be considered in evaluating this item.

Item 73 and Item 74

(Reserved)

Item 75 - Type of Work 3 digits

The information to be recorded for this item will be the type of work proposed to be accomplished on the structure to improve it to the point that it will provide the type of service needed and whether the proposed work is to be done by contract or force account. Code a 3-digit number composed of 2 segments.

| Segment | Description | Length |
|---|---|---|
| 75A | Type of Work Proposed | 2 digits |
| 75B | Work Done by | 1 digit |

This item must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. To be eligible, a bridge must carry highway traffic, be deficient and have a sufficiency rating of 80.0 or less. This item may be coded for other bridges at the option of the highway agency. Use one of the following codes to represent the proposed work type, otherwise leave blank:

| Code | Description |
|---|---|
| 31 | Replacement of bridge or other structure because of substandard load carrying capacity or substandard bridge roadway geometry. |
| 32 | Replacement of bridge or other structure because of relocation of road. |
| 33 | Widening of existing bridge or other major structure without deck rehabilitation or replacement; includes culvert lengthening. |
| 34 | Widening of existing bridge with deck rehabilitation or replacement. |

(codes continued on the next page)

Item 108 - Wearing Surface/Protective System (cont'd)

1st Digit - Type of Wearing Surface (Item 108A):

| Code | Description |
|---|---|
| 1 | Monolithic Concrete (concurrently placed with structural deck) |
| 2 | Integral Concrete (separate non-modified layer of concrete added to structural deck) |
| 3 | Latex Concrete or similar additive |
| 4 | Low Slump Concrete |
| 5 | Epoxy Overlay |
| 6 | Bituminous |
| 7 | Wood or Timber |
| 8 | Gravel |
| 9 | Other |
| 0 | None (no additional concrete thickness or wearing surface is included in the bridge deck) |
| N | Not Applicable (applies only to structures with no deck) |

2nd Digit - Type of Membrane (Item 108B):

| Code | Description |
|---|---|
| 1 | Built-up |
| 2 | Preformed Fabric |
| 3 | Epoxy |
| 8 | Unknown |
| 9 | Other |
| 0 | None |
| N | Not Applicable (applies only to structures with no deck) |

3rd Digit - Deck Protection (Item 108C):

| Code | Description |
|---|---|
| 1 | Epoxy Coated Reinforcing |
| 2 | Galvanized Reinforcing |
| 3 | Other Coated Reinforcing |
| 4 | Cathodic Protection |
| 6 | Polymer Impregnated |
| 7 | Internally Sealed |
| 8 | Unknown |
| 9 | Other |
| 0 | None |
| N | Not Applicable (applies only to structures with no deck) |

Item 113 - Scour Critical Bridges 1 digit

Use a single-digit code as indicated below to identify the current status of the bridge regarding its vulnerability to scour. Scour analyses shall be made by hydraulic/geotechnical/structural engineers. Details on conducting a scour analysis are included in the FHWA Technical Advisory 5140.23 titled, "Evaluating Scour at Bridges." Whenever a rating factor of 4 or below is determined for this item, the rating factor for Item 60 - Substructure may need to be revised to reflect the severity of actual scour and resultant damage to the bridge. A scour critical bridge is one with abutment or pier foundations which are rated as unstable due to (1) observed scour at the bridge site or (2) a scour potential as determined from a scour evaluation study.

| Code | Description |
|---|---|
| N | Bridge not over waterway. |
| U | Bridge with "unknown" foundation that has not been evaluated for scour. Since risk cannot be determined, flag for monitoring during flood events and, if appropriate, closure. |
| T | Bridge over "tidal" waters that has not been evaluated for scour, but considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections. ("Unknown" foundations in "tidal" waters should be coded U.) |
| 9 | Bridge foundations (including piles) on dry land well above flood water elevations. |
| 8 | Bridge foundations determined to be stable for assessed or calculated scour conditions; calculated scour is above top of footing. (Example A) |
| 7 | Countermeasures have been installed to correct a previously existing problem with scour. Bridge is no longer scour critical. |
| 6 | Scour calculation/evaluation has not been made. (Use only to describe case where bridge has not yet been evaluated for scour potential.) |
| 5 | Bridge foundations determined to be stable for calculated scour conditions; scour within limits of footing or piles. (Example B) |
| 4 | Bridge foundations determined to be stable for calculated scour conditions; field review indicates action is required to protect exposed foundations from effects of additional erosion and corrosion. |
| 3 | Bridge is scour critical; bridge foundations determined to be unstable for calculated scour conditions:<br>- Scour within limits of footing or piles. (Example B)<br>- Scour below spread-footing base or pile tips. (Example C) |

(codes continued on the next page)

Item 113 - Scour Critical Bridges (cont'd)

Code Description

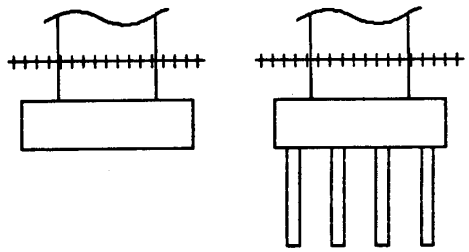
2 Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations. Immediate action is required to provide scour countermeasures.

1 Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic.

0 Bridge is scour critical. Bridge has failed and is closed to traffic.

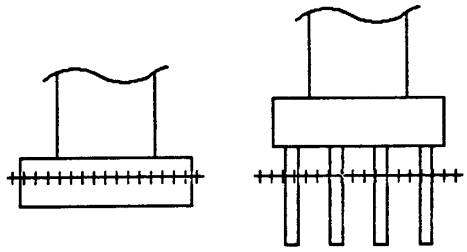
EXAMPLES: CALCULATED SCOUR DEPTH ACTION NEEDED

A. Above top of footing



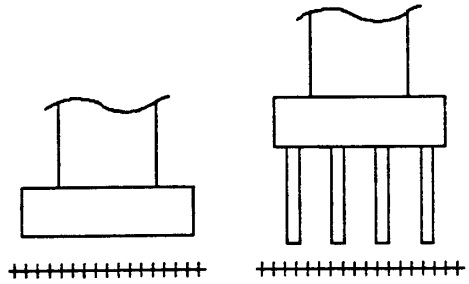
None - indicate rating of 8 for this item

B. Within limits of footing or piles



Conduct foundation structural analysis

C. Below pile tips or spread-footing base



Provide for monitoring and scour countermeasures as necessary

SPREAD FOOTING (NOT FOUNDED IN ROCK) PILE FOOTING

++++++++++++++++ = Calculated scour depth

# ERRATA SHEET
# RECORDING AND CODING GUIDE FOR THE STRUCTURE INVENTORY AND APPRAISAL OF THE NATION'S BRIDGES
# REPORT NO. FHWA-PD-96-001, DECEMBER 1995

**For Future Updates see: www.fhwa.dot.gov/bridge/bripub.htm**

Page vi, INTRODUCTION
Add the following paragraph at the end of the page:

"Some bridge owners are collecting bridge condition ratings for items included in this Guide (Items 58-Deck, 59-Superstructure, 60-Substructure, and 62-Culvert) using the American Association of Highway and Transportation Officials' (AASHTO) Guide for Commonly Recognized (CoRe) Structural Elements. CoRe element inspection ratings provide detailed condition assessments that can serve as input into a comprehensive bridge management system (BMS). The FHWA has provided bridge owners with a computer program for translating bridge condition data in the CoRe element format to National Bridge Inventory (NBI) condition ratings for the purpose of NBI data submittal to FHWA. The purpose of the program is to permit bridge inspectors to record condition information in a format that satisfies both BMS and NBI data collection requirements."

Page x, DEFINITION OF TERMS
Add the following definition at the end of the page:

"(s)) Commonly recognized (CoRe) Structural Elements.) A group of structural elements endorsed by AASHTO as a means of providing a uniform basis for data collection for any bridge management system, to enable the sharing of data between States, and to allow for a uniform translation of data to NBI Items 58, 59, 60, and 62."

Page 5 Item 6B, Critical Facility Indicator, will no longer be coded. Blank space will be inserted in its place.

Page 12 Item 21 and Item 22 - The following additional codes will be added to the list of maintenance responsibility and owner codes:
57 – GSA
58 – Zoo / Smithsonian
59 - NSA
61 - Indian Tribal Government
72 - Air Force
73 - Navy/Marines
74 - Army
75 - NASA
76 - Metropolitan Washington Airports Authority
77 – Pentagon
78- USDA/ARS
79 - DOE

Page 16: Item 31 – Code 9 has been modified to read MS 22.5 or greater; HS 25 or greater. New codes are added as follows: 0 – Unknown; A – HL93; B – Greater than HL93; and C Other. For more coding information and the memorandum see http://www.fhwa.dot.gov/bridge/110202.cfm.

Page 16: Item 32 - Approach Roadway Width, the example on the title line should be (XXX.X meters). On the first line of text it should read "Code a 4-digit number . . . ".

Page 17 Item 32 - Approach Roadway Width, in the examples the column showing the coding should read from top to bottom 0078, 0162, 0450, and 0288.

Page 22 Item 39 - Navigation Vertical Clearance, the example on the title line should be (XXX.X meters). On the 4th line of text it should read ". . . as a 4-digit number . . . ". In the examples the column showing the coding should read from top to bottom: 0500, 0206, and 0242.

Page 22 Item 40 - Navigation Horizontal Clearance, the example on the title line should be (XXXX.X meters). On the 6th line of text it should read ". . . as a 5-digit number . . . ". In the Examples the column showing the coding should read from top to bottom: 00535, 00950, and 02020.

Page 37 Items 58 through 62 - Add the following sentence to the first paragraph: "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.

Page 39 ITEM 60 - Substructure, The 2nd paragraph is changed to the following: "All substructure elements should be inspected for visible signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage, and corrosion. The rating factor given to Item 60 should be consistent with the one given to Item 113 whenever a rating factor of 2 or below is determined for Item 113 - Scour Critical Bridges."

Page 42&44 Item 63 and 65 – Method Used to Determine Operating and Inventory Rating: The following codes are added 6 – Load Factor (LF) rating reported by rating factor (RF) method using MS18 loading; 7 – Allowable Stress (AS) rating reported by rating factor (RF) method using MS18 loading; 8 - Load and Resistance Factor Rating (LRFR) rating reported by rating factor (RF) method using HL-93 loadings. For more information and the memorandum see http://www.fhwa.dot.gov/bridge/032204.htm . Code 0 has been added and reads "Field evaluation and documented engineering judgment". Code 5 has been modified to read "No rating analysis or evaluation performed". For more coding information and the memorandum see http://www.fhwa.dot.gov/bridge/110202.cfm.

Page 63 Item 92C - Other Special Inspection, Guideline for maximum allowable interval between inspections will be changed to 60 months.

Page 67 Item 100 - STRAHNET Highway Designation, The coding for this item is changed to the following:

| Code | Description |
|---|---|
| 0 | The inventory route is not a STRAHNET route. |
| 1 | The inventory route is on a Interstate STRAHNET route. |
| 2 | The inventory route is on a Non-Interstate STRAHNET route. |
| 3 | The inventory route is on STRAHNET connector route. |

Page 75 Item 113 - Scour Critical Bridges, the item has been changed to the following:

Item 113 - Scour Critical Bridges 1 digit

Use a single-digit code as indicated below to identify the current status of the bridge regarding its vulnerability to scour. Evaluations shall be made by hydraulic/geotechnical/structural engineers. Guidance on conducting a scour evaluation is included in the FHWA Technical Advisory T 5140.23 titled, "Evaluating Scour at Bridges."[1] Detailed engineering guidance is provided in the Hydraulic Engineering Circular 18 titled "Evaluating Scour at Bridges."[2] Whenever a rating factor of 2 or below is determined for this item, the rating factor for Item 60 -- Substructure and other affected items (i.e., load ratings, superstructure rating) should be revised to be consistent with the severity of observed scour and resultant damage to the bridge. A plan of action should be developed for each scour critical bridge (see FHWA Technical Advisory T 5140.23, HEC 18 and HEC 23[3]). A scour critical bridge is one with abutment or pier foundation rated as unstable due to (1) observed scour at the bridge site (rating factor of 2, 1, or 0) or (2) a scour potential as determined from a scour evaluation study (rating factor of 3). It is assumed that the coding of this item has been based on an engineering evaluation, which includes consultation of the NBIS field inspection findings.

| Code | Description |
|---|---|
| N | Bridge not over waterway. |
| U | Bridge with "unknown" foundation that has not been evaluated for scour. Until risk can be determined, a plan of action should be developed and implemented to reduce the risk to users from a bridge failure during and immediately after a flood event (see HEC 23). |
| T | Bridge over "tidal" waters that has not been evaluated for scour, but considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections until an evaluation is performed ("Unknown" foundations in "tidal" waters should be coded U.) |
| 9 | Bridge foundations (including piles) on dry land well above flood water elevations. |

8 Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above top of footing (Example A) by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge[4]), by calculation or by installation of properly designed countermeasures (see HEC 23).

7 Countermeasures have been installed to mitigate an existing problem with scour and to reduce the risk of bridge failure during a flood event. Instructions contained in a plan of action have been implemented to reduce the risk to users from a bridge failure during or immediately after a flood event.

6 Scour calculation/evaluation has not been made. (Use only to describe case where bridge has not yet been evaluated for scour potential.)

5 Bridge foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be within the limits of footing or piles (Example B) by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), by calculations or by installation of properly designed countermeasures (see HEC 23).

4 Bridge foundations determined to be stable for assessed or calculated scour conditions; field review indicates action is required to protect exposed foundations (see HEC 23).

3 Bridge is scour critical; bridge foundations determined to be unstable for assessed or calculated scour conditions:
- Scour within limits of footing or piles. (Example B)
- Scour below spread-footing base or pile tips. (Example C)

2 Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by:
- a comparison of calculated scour and observed scour during the bridge inspection, or
- an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60.

1 Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic. Failure is imminent based on:
- a comparison of calculated and observed scour during the bridge inspection, or
- an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60.

0 Bridge is scour critical. Bridge has failed and is closed to traffic.

[1] FHWA Technical Advisory T 5140.23, Evaluating Scour at Bridges, dated October 28, 1991.
[2] HEC 18, Evaluating Scour at Bridges, Fourth Edition.
[3] HEC 23, Bridge Scour and Stream Instability Countermeasures, Second Edition.
[4] FHWA Memorandum "Scourability of Rock Formations," dated July 19, 1991.

Page 77 Item 116 - Minimum Navigation Vertical Clearance, Vertical Lift Bridge, the example on the title line should be (XXX.X meters). On the 1st line of text it should read ". . . code a 4-digit number . . . ". In the examples the column showing the coding should read from top to bottom: 0106, and 0242.

Page B-5 For the computation of "Y" (Width / Lane) the following will be added:

$$Y \text{ (Width / Lane)} = \frac{\text{Item 51 (Bridge Rdwy. Width)}}{\text{First 2 digits of \#28 (Lanes)}} *$$

*A value of 10.9 meters will be substituted when item 51 is coded "0000" or not numeric

Page B-8 For the computation of "H" the following correction is for the electronic copy

If $X > 1350$ and $Y \geq 4.6 < 4.9$ Then $H = 15((4.9-Y) / 0.3)$ %

Page D-1 Definition of Items should read Definition of Terms".

Page D-1 Under Definition of Terms item (b) should read "Culvert."

Page D-1 Under Definition of Terms item (i) should read "Strategic Highway Corridor Network (STRAHNET). Replaces Defense Items, which were dropped."

Page E-1 For Item No. 2 the Item Name should read "Highway Agency District."

Page E-1 For Item No. 11 the Item Name should read "Kilometer Point"

Page E-4 For Item No. 116 the Item Position should read A386 - 389" and the Item Length/Type should read "4/N"

Page E-4 ---Washington Headquarters Use Item Position should read "390 - 427".

Updated June 2011