2020 LOCAL BRIDGE INSPECTION MANUAL

Kansas Department of Transportation

BUREAU OF LOCAL PROJECTS KDOT

Prepared by

Kansas Department of Transportation

Bureau of Local Projects

Bridge Team

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PURPOSE OF MANUAL

This manual was developed by the Kansas Department of Transportation (KDOT) Bureau of Local Projects (BLP) for the inspection of locally owned and maintained bridges. This manual will provide guidelines to personnel completing the actual inspection or using the inspection information and guidance on preparing the documentation to Federal Highway Administration (FHWA). This manual follows the format of the Structure Inventory and Appraisal (SI&A) sheet, the BLP Bridge Inspection Portal (BIP), and the Local Projects Bridge Inspection Form (LPBIF).

This manual is designed to aid in the completion of the National Bridge Inventory (NBI) Condition Ratings by outlining the data items that are to be collected on bridges and including definitions and diagrams for items typically encountered during field inspections. The NBI ratings provide only a general overall rating for deck, superstructure, substructure, channel, or culvert. All the condition descriptions found within this manual for the NBI Condition Ratings are the interpretation by KDOT BLP of the recommended guidelines found in the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges" published by the FHWA. This interpretation is intended to meet the FHWA guide and provide the field inspector guidance in giving a rating for the condition present. These ratings are submitted annually to the FHWA as required by the National Bridge Inspection Standards (NBIS).

If this manual conflicts with any of the requirements of the Code of Federal Regulations (CFR), then the current versions of the NBIS, AASHTO "Manual for Bridge Evaluation", "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges", or "Bridge Inspector's Reference Manual" (BIRM) shall govern. Bridge owners and inspectors are encouraged to consult with KDOT BLP on matters where exceptions to items in this manual may be applicable.

NBIS APPLICABILITY

As per the Code of Federal Regulations (CFR) 23 CFR § 650.303, the NBIS applies to all structures defined as highway *[23 U.S.C. § 101(a)(11)-a road, street, and parkway]* bridges located on all public roads *[23 U.S.C. § 101(a)(22)-any road or street under the jurisdiction of and maintained by a public authority and open to public travel].*

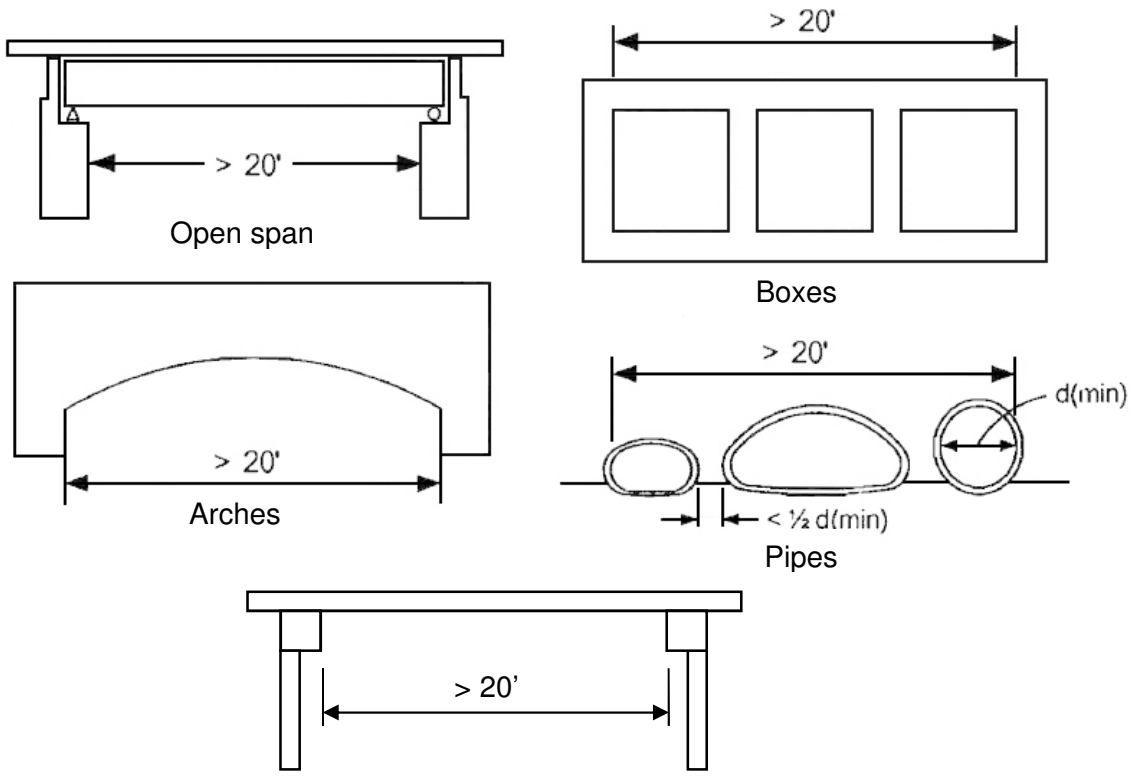
The NBIS does not apply to:

- Tunnels
- Bridges carrying only pedestrians (vertical and horizontal under clearance measurements should be recorded for routes under)
- Bridges carrying only railroad tracks (vertical and horizontal under clearance measurements should be recorded for routes under)
- Pipelines
- Any other type of non-highway passageway

A request to remove a bridge from the bridge owner inventory with appropriate documentation (such as ownership papers, maintenance agreements, road vacations, photographs, etc.) shall be submitted to KDOT BLP at **KDOT.BLPBridge@ks.gov**.

DEFINITION OF A BRIDGE

23 C.F.R. § 650.305 defines a bridge as "a structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of **more than 20 feet between undercopings of abutments** *[the inside faces of the end supports]* **or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening."** [emphasis added]



MEASUREMENT TO DETERMINE NBIS BRIDGE LENGTH

BRIDGE TYPES

A bridge can be built using a variety of materials for a variety of designs. Because there are several different combinations identified by NBI Item 43 (A&B), KDOT has a coding system to identify a type of bridge by using the material type, superstructure type, and design feature. See

Chapter 3 - Structure Inventory Data for more information. The listing of the available KDOT structure types is found in Appendix F.

CLOSED BRIDGES

If any of NBI Items 58, 59, 60, or 62 are coded as "1" or "0" or if the bridge is not capable of carrying a minimum gross live load weight of three tons, then NBI Item 41 **must** be coded as "K – Closed To All Traffic".

A closed bridge is not required to be inspected for the NBI.

A closed bridge must be inaccessible to vehicular traffic. The bridge owner should periodically verify the conditions concerning the closed bridge, including signing and barricades.

If a closed bridge is scheduled for rehabilitation or replacement within five years of closure, pertinent information to the closure and plan of replacement should be recorded in the Bridge Inspection Portal as part of a Bridge Note.

A closed bridge should be archived in the NBI database when there is no intention to re-open the bridge. Contact KDOT BLP at **KDOT.BLPBridge@ks.gov** to archive a closed bridge in the NBI database.

To re-open a closed bridge, an Inventory Inspection must be performed and Load Ratings verified or calculated before traffic is allowed on the bridge.

BRIDGE FILE AND RECORDS

A Bridge File describes all the bridges under the jurisdiction of the bridge owner. It contains one record for each bridge and other general information which applies to more than one bridge. A Bridge Record contains the cumulative information about an individual bridge. It should provide a full history of the bridge including, but not limited to, damages, all strengthening, and all repairs made to the bridge. KDOT BLP recommends that any new documents for a bridge be added to the KDOT BLP Bridge Inspection Portal (BIP) to be easily referenced in the case discrepancies are found with existing field conditions.

BRIDGE RECORD

Required Items

Inspection History: Each Bridge Record is required to include all inspection reports and Structure Inventory and Appraisal (SI&A) sheets assembled in chronological order with the most recent sheets on top. A bridge owner may choose to split the information into an Archive Record and a Current Record. The Current Record shall contain at least the last two Routine Inspections and most current Special Inspection(s) (Fracture Critical Member, Underwater, Pin and Hanger, et al.) and instructions on how to access the Archive Record.

Current Photographs: Each Bridge Record is required to contain current color photographs of:

1. Roadway approach view (or if NBI Item 41 ≠ "A – Open, No Restriction", one from each direction showing posting sign, or lack thereof)
2. Elevation view (noting all wet substructure elements)
3. Typical superstructure view
4. Upstream and downstream views, any revised channel alignment, and new scour
5. Any detail causing a condition rating ≤ "4"
6. All known typical defects
7. All utility attachments
8. All damaged expansion joints. (Note: Document the expansion gap width and air temperature)
9. Special features (examples would include, but are not limited to, cribbing and new maintenance repairs)

Current photographs need to be taken no more than two Routine Inspection cycles apart and no more than 48 months apart.

Photographs should be assembled and documented using the BLP supplied Photograph Template (available from the KDOT Authentication and Resource Tracking (KART) website at **http://kart.ksdot.org/** under Local Projects Inspection Docs and Forms), or a similar format (See Appendix A). A sheet shall have a maximum of four photographs. A concise but clear description is required in the supplied text box under each photograph. Be descriptive in labels and use terms such as "Upstream" or "Downstream", "N", "S", "E", "W", or "size of [defect]".

Inspection Requirements: Each bridge record is required to include a list of specialized tools and equipment, descriptions of unique bridge details, descriptions of features requiring non-routine inspection procedures, and method(s) of access (to assist in planning and conducting Fracture Critical Member, Underwater, Pin and Hanger, or other Special Inspections, including flood, fire, collision damage, etc.).

Load Ratings: Each Bridge Record is required to contain a Load Rating Summary Sheet (LRSS) for the bridge as specified in Load Ratings in this chapter. Any load ratings performed after January 1, 2009, must be sealed and signed by a Professional Engineer licensed in Kansas.

Scour Evaluation: Each Bridge Record for a bridge over a waterway is required to contain the Item 113 Justification Form for scour vulnerability. When a bridge does not cross a waterway, the Item 113 Justification Form is to reflect the bridge is not over a waterway and NBI Item 113 shall be coded as "N". For further information, refer to Chapter 10 - Scour.

Recommended Items

Plans: Each Bridge Record should at least have the Construction Layout sheet and the Engineering Geology sheet (if applicable) from the bridge plans, but preferably contain the full set of as-built construction plans (may be on 11" x 17" sheets).

Maintenance Records: Each Bridge Record should include maintenance and repair documentation in chronological order occurring since the initial construction of the bridge. Details such as date, description of project, contractor, cost, contract number, and related data for in-house projects should be included.

Flood Data: For those bridges over waterways, a chronological history of major flooding events, including high water marks at the bridge site and scour activity, is preferred in the Bridge Record.

Miscellaneous: Other items that may be beneficial to have in the bridge records are correspondences consisting of all pertinent letters, memorandums, telephone memos, and all other related information directly concerning the bridge in chronological order. Accident records, including damage occurrences, and a summary of all posting actions should also be considered for inclusion.

ELECTRONIC BRIDGE FILE AND RECORDS

A bridge owner may elect to keep their bridge file and records electronically. Once the decision has been made to move to electronic bridge file and records, the entire existing bridge file and records, as well as future bridge information, should be converted and stored electronically. The portable document format (PDF) is a widely used free format that may be saved into the BIP as an unofficial backup.

LOAD RATINGS

Load ratings are required for all bridges. A bridge load rating is a calculation of the live load carrying capacity of an existing bridge. A load rating will determine if a structure has substandard

live load carrying capacity which may require posting, change of posting levels, or closure. The live load carrying capacity is separated into, depending on the method used to load rate the bridge, an Operating Rating, an Inventory Rating, and typically, a Posting Level for the structure, if necessary. The Inventory and Operating rating values are reported to FHWA through the NBI submittal.

Operating Rating (OR) generally describes the maximum permissible live load to which the structure may be subjected. Allowing unlimited numbers of vehicles to use the bridge at operating level may shorten the life of the bridge.

Inventory Rating (IR) is the level that generally corresponds to the customary design level of stresses but reflects the existing bridge and material conditions with regard to deterioration and loss of section. Load ratings based on the inventory level allow comparisons with the capacity for new structures and, therefore, results in a live load, which can safely utilize an existing structure for an indefinite period of time.

Design Load is the maximum load the structure was designed to carry.

Posting Level is a load which is typically recommended by an engineer and established by the bridge owner. The Posting Level must be lower than or equal to the OR values and greater than or equal to three tons.

Load Factor Rating (LFR) and Load and Resistance Factor Rating (LRFR) are both acceptable methods to load rate existing bridges. All new bridges are required to be load rated using LRFR. One load rating method shall be reported on the required Load Rating Summary Sheet (LRSS) and in the BIP. The Load Rating shall be reviewed during all routine bridge inspections and may need to be updated when the inspection frequency changes.

A LRSS for recording the load rating shall be used. An electronic version of the form in Microsoft Excel format is available from the KART website at **http://kart.ksdot.org/** under **Local Projects Inspection Docs and Forms**. An example of this form can be found in Appendix E.

The following is the minimum load rating information that shall also be included in the Bridge Record:

- Method used for rating (ASR, LFR, LRFR)
- The Condition Rating for the Deck, Superstructure, Substructure, and Culvert at the time of the rating
- How section properties were determined
- Assumptions made and rationale used
    - Material properties
        - Tensile strength of steel, F_y
        - Compressive strength of concrete, f'_c
    - Any loss of section to account for deteriorated conditions
    - Any other assumptions such as area of steel (A_s), lateral bracing, or number of live load lanes

- IR and OR for all AASHTO legal rating trucks (T3, T3S2, T3-3) and the Notional Rating Load (NRL) truck or each individual Special Haul Vehicle (SHV) (SU4, SU5, SU6, SU7) if the NRL truck OR factor is less than 1.0
- IR and OR for design truck(s) (HS-20, HL-93)
- IR and OR for Emergency Vehicles (EV2, EV3)
- Method used for calculating (AASHTOWare BrR, BRASS, self-developed programs, or spreadsheets, hand calculations, etc.)

The actual calculations are not required. The intent is to have enough supplemental information included to make it possible for others to verify the load rating values listed on the LRSS in the Bridge Record.

The LRSS shall be sealed and signed by the Professional Engineer licensed in Kansas with the overall responsibility for analysis of the bridge and the final load rating.

FHWA Memo HIBT-10 mandates the inclusion of Special Haul Vehicles (SHVs) in new load ratings for all bridges on public roads. Any bridge with a current load rating which does not include SHVs is not a valid load rating. Any new bridge must have a valid load rating before it is open to traffic.

Emergency Vehicles shall be load rated for all bridges on public roads. In 2018, legal weights of emergency vehicles (fire trucks) were increased dramatically; see K.S.A. 8-1920. Legal weights of fire trucks are 86,000 lb. gross, 24,000 lb. single axle, and 62,000 lb. tandem axle. Kansas Law does not exempt emergency vehicles from size and weight limitations on bridges. In some cases, weight limit signs will be needed that only apply to emergency vehicles.

INSPECTIONS

INVENTORY BRIDGE INSPECTION

An Inventory Inspection is required for all new, rehabilitated, or repaired bridges, and **must be completed within 90 days** after the Notice of Acceptance for the bridge is issued or the bridge is opened (or re-opened) to traffic, whichever comes first. The Inventory Inspection is the first inspection of the bridge as it becomes part of the bridge inventory and is the first Routine Bridge Inspection (See Appendix E for a sample Inventory Inspection Report). KDOT provides the unique 15-digit structure number (NBI Item 8) for the life of the bridge. An Inventory Inspection Form is to be used for the initial inspection. A Local Projects Bridge Inspection Form (LPBIF) may be used for rehabilitations and repairs.

A new Load Rating is also required for all Inventory Inspections based on any new conditions or modifications affecting the structural condition of the bridge. The Load Rating must meet the requirements set forth earlier in this chapter. The work to provide the Load Rating is separate from the work to complete the Inventory Inspection unless otherwise specified in the bridge inspection contract.

Any newly constructed bridge requires an Item 113 Justification Form. This form is to be completed by the engineer responsible for the bridge design. NBI Item 113 is used to identify the current status of a bridge regarding its vulnerability to scour. Chapter 10 contains details regarding scour vulnerability and NBI Item 113.

Repair projects such as deck overlays, widening, changing bridge rail type, collision repairs, or any other work that changes an NBI inventory item qualify as examples of bridge work requiring an Inventory Inspection. Examples of exceptions would be a maintenance project where the steel elements were painted or the guardrail attached to the bridge ends was improved.

All condition rating changes due to rehabilitation or repair projects require a written description of work completed and photographs to document the changes. The required photographs for all Inventory Inspections shall be submitted in color and maintained by the bridge owner in the Bridge Record. Digital copies should also be submitted to KDOT BLP through the Bridge Inspection Portal (BIP). Photographs required to be taken are:

New Bridges:

1. Roadway approach view
2. Elevation view (noting all wet substructure elements)
3. Typical superstructure view
4. Typical substructure views
5. All utility attachments
6. All unique features (expansion joints, bridge drainage systems, berm or channel protection, etc.)
7. Upstream and downstream channel views

Rehabilitated or Repaired Bridges:

1. Typical view of changes

2. Elevation view (noting all wet substructure elements)
3. All utility attachments
4. All unique features (expansion joints, new bridge rail, bridge drainage systems, berm or channel protection, etc.)
5. Upstream and downstream views and any revised channel alignment
6. All known typical defects

ROUTINE BRIDGE INSPECTION

Unless otherwise approved by the FHWA, Routine Inspections are required for all bridges at an interval not to exceed 24 months. All Routine Bridge Inspections are to be performed in accordance with the Local Routine Bridge Inspection Scope of Services found in Appendix A. If the bridge owner uses a consultant to perform the Routine Bridge Inspections, this scope of services must be included in the inspection contract. The bridge owner may include additional requirements of their choosing.

NBI condition codes are used to provide an overall characterization of the general condition of the entire component (deck, superstructure, substructure, channel and culvert) being rated, not to describe localized or nominally occurring instances of deterioration or disrepair. Load carrying capacity is not to be used in evaluating condition items. Any portion of a bridge being supported or strengthened by temporary members shall be rated without the temporary members being considered in the rating of the NBI Item.

Underwater Inspections classified as Type I or Type II (See next page) are performed as part of the Routine Inspection.

All Routine Bridge Inspections require a completed LPBIF signed and dated by the Bridge Inspection Team Leader. The Team Leader shall also print their name with their signature.

The Routine Bridge Inspection Submittal form shall be sealed and signed by the Professional Engineer in charge of the inspection group and submitted along with the Data Validation and Sufficiency Rating Calculation forms to KDOT BLP at **KDOT.BLPBridge@ks.gov** at the completion of the Routine Bridge Inspection process.

Element Level data collection is the process of evaluating conditions of individual components of a bridge on a per unit of measurement basis. Element Level data collection is required to be performed on bridges on the National Highway System (NHS) (See NBI Item 104 – Highway System of the Inventory Route, Chapter 3). This activity is performed by KDOT BLP.

SPECIAL BRIDGE INSPECTIONS

Fracture Critical Member Inspection (NBI Item 92A)

A Fracture Critical Member (FCM) Inspection is to investigate any bridge with steel structural members in tension or with a tension element whose failure could cause partial or total collapse of the bridge. FCM Inspections are performed within 18 inches of the FCMs. There is a statewide program available for FCM Inspections.

All FCM Inspections are to be performed in accordance with the Local Fracture Critical Member Inspection Scope of Services found in Appendix B. If the bridge owner uses a consultant to perform their Fracture Critical Member Inspections, this scope of services must be included in the inspection contract.

All FCM Inspections require a FCM Inspection Report. This report includes the updated SI&A sheet, the FCM Inspection form, sketches, diagrams, and photographs. The report is to be uploaded into the BIP from the schedule tab for the inspection.

The Fracture Critical Member Inspection Submittal form shall be sealed and signed by the Professional Engineer in charge of the inspection group and submitted along with the Data Validation and Sufficiency Rating Calculation forms to KDOT BLP at **KDOT.BLPBridge@ks.gov** at the completion of the bridge inspection process.

Underwater Inspection (NBI Item 92B)

An Underwater Inspection is to investigate any bridge element submerged in water. Underwater Inspections are classified as Type I, II, III, or IV. The classification type is to be recorded as an Inspection Note in the BIP and on the LPBIF. Type III and Type IV Underwater Inspections are to be performed in accordance with the Local Underwater Inspection Scope of Services found in Appendix C.

Type I and Type II inspections are performed as part of the Routine Bridge Inspection; they are not to be recorded as a Special Underwater Inspection. Type III and Type IV inspections are performed as a Special Underwater Inspection. There is a statewide program available for Special Underwater Inspections.

The classification types of Underwater Inspections are described as follows:

> Type I –Substructure elements are currently dry or in shallow and clear water such that visual inspection is possible.
>
> Type II –Substructure elements are not visible from above the surface of the water and the water depth is generally less than four feet at the time of the inspection. Substructure elements are accessible by wading.
>
> Type III –Substructure elements at the time of inspection are in water greater than four feet deep or are inaccessible by wading because of swift current. These structures should be inspected with necessary equipment to profile the channel bottom and possibly detect previous scour.
>
> Type IV –Substructure elements are inundated by water all year and require a diver to gain access for inspection.

An Underwater Bridge Inspection Diver must have completed the FHWA-NHI-130091 Underwater Bridge Inspection course and possess, at a minimum, PADI Open Water Diver

certification. This certification is to be presented upon request to KDOT BLP by the Underwater Inspection Team Leader.

Other Special Inspection (NBI Item 92C)

Pin and Hanger

A Pin and Hanger inspection is to investigate a specific detail used on long steel bridges to accommodate thermal expansion of the superstructure whose failure could cause partial or total collapse of the bridge. Pin and Hanger Inspections are to be performed in accordance with the Scope of Services for Pin and Hanger Inspection found in Appendix D. There is a statewide program available for Pin and Hanger Inspections.

Load Rating

Load Rating inspections are unscheduled inspections necessary to update load rating data.

Damage

Damage inspections are unscheduled inspections necessary to assess structural damage resulting from environmental or man-made causes (i.e. flood, fire, collision, etc.). The scope of this type of inspection must determine the need for repairs, emergency load restrictions, or the closure of the bridge to traffic.

Other Special

Other Special inspections are unscheduled inspections necessary to update bridge data in the BIP when a full Routine Bridge Inspection was not performed for the update. These items may include updating Scour Assessments, Inspection Frequencies, etc. These entries into the BIP must be coordinated through KDOT BLP. Inspection notes must be included to provide information on the reason for the inspection entry.

BRIDGE INSPECTION DATA UPDATES

When any Inventory, Routine, or Special Inspection is performed or if any inventory items change (e.g. load ratings, posting signs, bridge closure, etc.), the data shall be updated and submitted to KDOT BLP through the BIP within 90 days of the inspection. The data must be validated and the validation submitted to **KDOT.BLPBridge@ks.gov** upon completion of the inspection input in the BIP for the LPA.

CRITICAL INSPECTION FINDINGS

A bridge with NBI Item 58, 59, 60, or 62 coded as "2" must have a Critical Inspection Finding (CIF) completed and submitted to KDOT BLP. The timely reporting of a CIF is helpful in preventing collapse or premature permanent closure of a bridge and could initiate the repair, strengthening, or shoring of the bridge. A CIF is required to be submitted with each Routine Inspection until the issue causing the CIF is resolved.

A CIF is required in any of the above criteria but may be issued anytime at the discretion of the Team Leader using engineering judgment on a case by case basis.

With the above criteria being stated, it should also be noted NBI condition codes are properly used when they provide an overall characterization of the general condition of the entire component (deck, superstructure, substructure, or culvert) being rated. They are improperly used if they attempt to describe localized or nominally occurring instances of deterioration or disrepair. Load carrying capacity is not to be used in evaluating condition items. Portions of a bridge being supported or strengthened by temporary members shall be rated based on their actual consideration: that is, the temporary members are not considered in the rating of the item. Monitoring areas of concern should be considered when isolated instances of deterioration are present but do not affect the entirety of the bridge component.

Bridge Inspection Team Leaders are to notify the bridge owner **immediately of a CIF by verbal contact. A message is not considered verbal contact and is not adequate.** The CIF shall be on the BLP Critical Inspection Finding form (See Critical Inspection Finding form in Appendix E). The CIF shall be submitted within **two days** of the inspection to both the bridge owner and KDOT BLP. The CIF with the owner response and plan of action shall be submitted to KDOT BLP **within two weeks** of the inspection. Submissions to KDOT BLP should be emailed to **KDOT.BLPBridge@ks.gov** and uploaded into the BIP. A Bridge Note and an Inspection Note shall also be added in the BIP when the data is entered.

It is intended for CIFs to be handled as expediently as reasonably possible. The time frame indicated in these procedures is necessary to meet FHWA, Kansas Division, guidelines on follow-up of CIFs.

BRIDGE INSPECTION FREQUENCIES

Routine Bridge Inspections (NBI Item 91)

24-Month Interval is used for all bridges which do not meet the criteria for a 12-month Routine Bridge Inspection interval.

12-Month Interval is required for a bridge when NBI Item 58, 59, 60, or 62 is coded as "2" or "3". The bridge owner may elect to inspect on a 12-month interval if it is not required by the condition rating. When this occurs, a Bridge Note explaining the reason needs to be included in the BIP.

Special Bridge Inspections

Fracture Critical Member (FCM) Inspections (NBI Item 92A.b)

24-Month Interval is used for all bridges with FCMs which do not meet the criteria for a 12-month Fracture Critical Member Inspection interval.

12-Month Interval is required for a bridge with FCMs when NBI Item 59 or 60 is coded as "2" or "3" due to the condition of the Fracture Critical Members. Monitoring of areas of

concern should be considered when isolated instances of deterioration are present but do not necessitate a full FCM Inspection.

Underwater Inspections (NBI Item 92B.b)

60-Month Interval is used for all bridges with a Type III or Type IV Underwater Inspection classification with a Condition Rating of a "6", "7", or "8" for NBI Item 60 or 62. This interval should be scheduled starting at 48 months to allow for delays due to unfavorable water conditions.

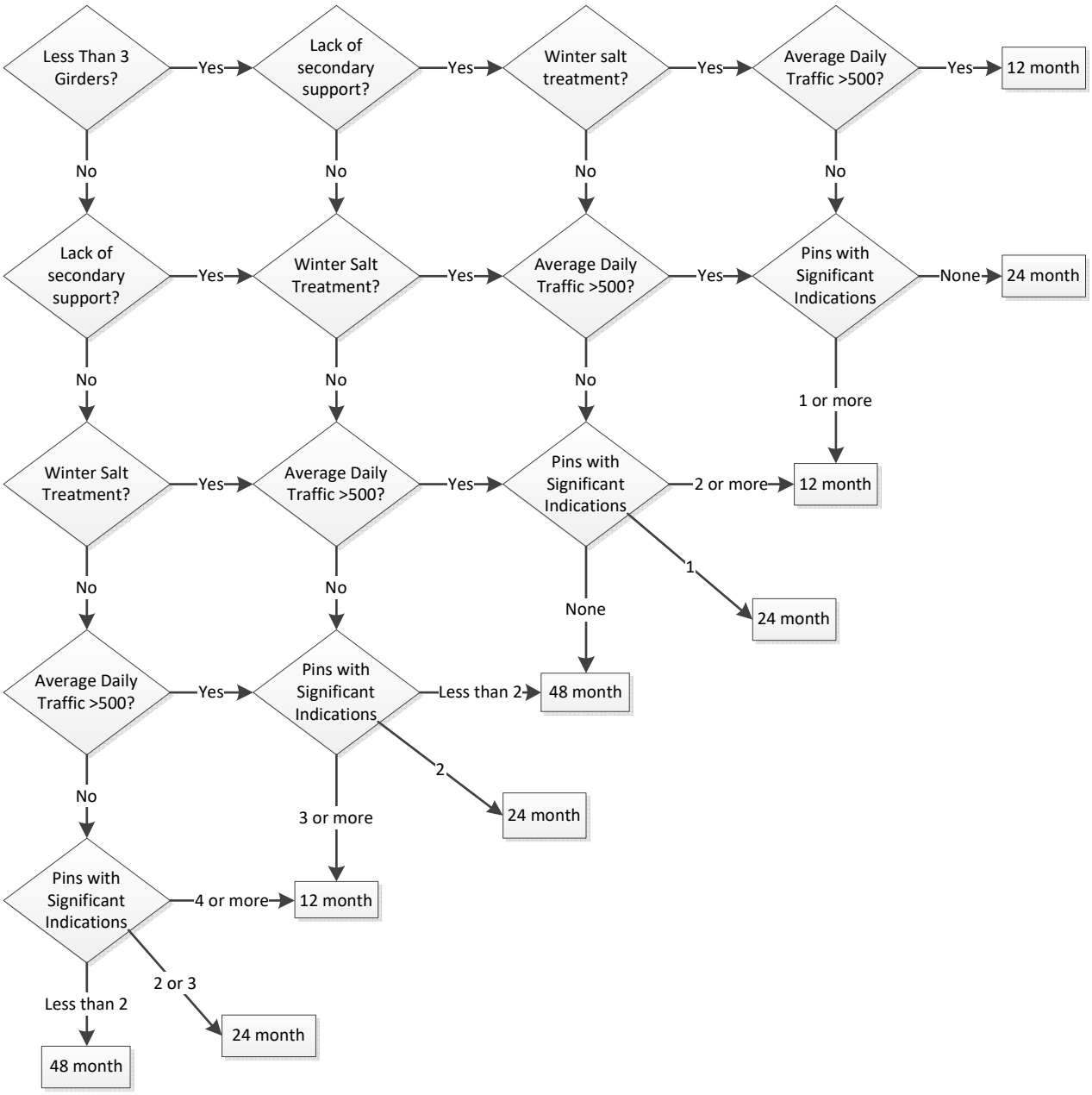
36-Month Interval is used for all bridges with a Type III or Type IV Underwater Inspection classification with a Condition Rating of a "4" or "5" for NBI Item 60 or 62 due to the condition of the elements located below the water line. This interval should be scheduled starting at 24 months to allow for delays due to unfavorable water conditions.

12-Month Interval is required for a bridge with underwater elements when NBI Item 60, 61, or 62 is coded as "2" or "3" due to the condition of the elements below the water line.

Pin and Hanger Inspections (NBI Item 92C.b)

In increments of 12-month intervals, up to and not exceeding 48 months based on varying conditions as shown in the Pin and Hanger Inspection Frequency Flowchart.

Pin and Hanger Inspection Frequency Flowchart



Damage/Load Rating/Other Special Inspections (NBI Item 92C)

Unscheduled with no inspection interval.

More frequent monitoring may be required on bridges with extreme condition problems.

LOCAL BRIDGE INSPECTION QC/QA PROCEDURES

Quality Control/Quality Assurance (QC/QA) procedures are used by KDOT BLP to maintain accuracy and consistency of local bridge inspections, records, and data for all bridges owned and maintained by a Local Public Authority (LPA). The QC procedures are intended to maintain or improve the quality of all local bridge inspections, while the QA procedure uses sampling to verify that the accuracy of the local bridge inspections are consistent throughout all LPAs.

The QC procedures used by KDOT BLP include:

- Providing periodic review and revision of the "Scope of Services for Local Routine Bridge Inspections Contracts" and the "Scope of Services for Local Fracture Critical Member Inspections Contracts" for use on LPA owned and maintained bridge inspections.
- Providing periodic review and revision of the KDOT BLP Bridge Inspection Manual, standardized bridge inspection forms and other bridge inspection documents for use on inspections of LPA owned and maintained bridges.
- Providing qualifications for Local Bridge Inspection Team Leaders and maintaining a list of Local Bridge Inspection Team Leaders who are qualified to perform bridge inspections of LPA owned and maintained bridges.
- Providing annual Local Bridge Inspection Team Leader training and hosting a FHWA-NHI Bridge Inspection Refresher Training course.
- Providing periodic review and revision of policies and procedures which provide guidance to help Local Bridge Inspection Team Leaders maintain a consistent and acceptable level of performance.
- Providing maintenance and enhancement of the web-based database for LPA owned and maintained bridge inspection data known as the Local Bridge Inspection Portal.
- Providing periodic reviews and coordinated revisions of bridge inspection data submitted into the Local Bridge Inspection Portal by Local Bridge Inspection Team Leaders for bridge inspections performed for LPA owned and maintained bridges.

The QA procedure used by KDOT BLP involves on-site field reviews of a randomly selected sample of LPA owned and maintained bridges to verify the accuracy of select bridge inspection data on the most recent Routine Bridge Inspection form and with the bridge inspection data entered in the Local Bridge Inspection Portal. This is performed on a systematic basis over a two-year cycle.

The randomly selected sample is created from the LPA owned and maintained bridges that were submitted to FHWA the previous year in response to the Annual Call for Updates of the National Bridge Inventory and alternates between the north and south KDOT Districts each year. Each bridge submitted to FHWA the previous year is given a randomly generated number and numerically ordered. The sample size selected includes approximately one half of one percent of the bridges each year.

Any discrepancies found by the QA field reviews will be investigated further to determine the extent of the discrepancy, whether data corrections are needed, and what QC or QA procedural revisions, if any, need to be enacted to prevent similar data discrepancies in the future.

An annual report is prepared summarizing the findings of the QA field reviews and announcing any QC or QA procedural revisions that will be enacted as a result of the QA field reviews.

Every four years, but more often if needed, the QC/QA procedures will be reviewed and revised to allow for the efficient use of KDOT BLP resources and the overall effectiveness of the QC/QA procedures.

Chapter

2

BRIDGE INSPECTION TEAM LEADER POLICIES

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GENERAL

KDOT BLP has set minimum qualifications to be a Bridge Inspection Team Leader for various types of bridge inspections. Each Bridge Inspection Team Leader is issued a unique identification number and login for the BIP. KDOT BLP will maintain a list of qualified Bridge Inspection Team Leaders. The list of Bridge Inspection Team Leaders is available for review on the BLP website at **http://www.ksdot.org/Assets/wwwksdotorg/bureaus/burLocalProj/Bridge/InspPQL.pdf**.

To be placed on this list, a candidate must complete the Request for BLP Bridge Inspection Team Leader Status form (available from KART (**http://kart.ksdot.org/**) and attach all required supporting documentation. The supporting documentation must include a certificate letter stating the candidate's years of bridge inspection experience, if applicable, and the number of bridge inspections the candidate participated on. **This letter shall be sealed and signed by a Professional Engineer licensed in Kansas.** Submit this package to KDOT BLP at **KDOT.BLPBridge@ks.gov**.

A person outside of Kansas who meets the requirements may apply for Bridge Inspection Team Leader status. KDOT BLP will not reciprocate qualification for Bridge Inspection Team Leader from another state unless their requirement meets or exceeds those stated in this section.

TEAM LEADER REQUIREMENTS

Routine Bridge Inspection Team Leader

A Routine Bridge Inspection Team Leader is required on all Routine Bridge Inspections. It is recommended at least one other individual be present on all Routine Bridge Inspections. All Routine Bridge Inspection Team Leaders have the responsibility to complete inspections in accordance with the KDOT BLP Bridge Inspection Manual and the Scope of Services for Local Routine Bridge Inspection Contracts found in Appendix A.

All Applicants shall meet the following requirements:

- Completed-
  - FHWA-NHI-130055 Safety Inspection of In-Service Bridges or FHWA-NHI-130056 Safety Inspection of In-Service Bridges for Professional Engineers
  - FHWA-NHI-130053 Bridge Inspection Refresher Training is required on a five-year maximum interval after completion of the Safety Inspection of In-Service Bridges course
- Annually complete the KDOT BLP Bridge Inspection Team Leader Training Course (exceptions may be granted in cases of extended military leave or situations covered under the Family Medical Leave Act (FMLA))

Professional Engineer (PE) shall also have participated in the inspection of at least **50** bridge inspections within the immediately preceding five years.

Intern Engineer (IE) shall also meet the following:

- Two years of bridge inspection experience as defined later in this section

- Participated in the inspection of at least **100** bridge inspections within the immediately preceding five years

Engineering Technician (ET) shall also meet the following:

- Five years of bridge inspection experience as defined later in this section
- Participated in the inspection of at least **200** bridge inspections within the immediately preceding five years
- One of the five years of inspection experience may be waived with the completion of an associate degree in engineering or engineering technology
- The five years of inspection experience can be waived with the completion of NICET Testing for Bridge Inspection (Level 3 or 4)

Fracture Critical Member Inspection Team Leader

A Fracture Critical Member Team Leader is required on all Fracture Critical Member Inspections. It is recommended at least one other individual be present on all Fracture Critical Member Inspections. All Fracture Critical Member Team Leaders have the responsibility to complete inspections in accordance with the KDOT BLP Bridge Inspection Manual and the Scope of Services for Inclusion in Local Fracture Critical Member Inspection Contracts found in Appendix B.

A Fracture Critical Member Inspection Team Leader shall meet all applicable requirements for Routine Bridge Inspection Team Leader and have successfully completed the FHWA-NHI-130078 Fracture Critical Inspection Techniques for Steel Bridges course.

Underwater Inspection Team Leader

An Underwater Inspection Team Leader is required on Type III & IV level Underwater Inspections. It is recommended at least one other individual be present on all Underwater Inspections. All Underwater Inspection Team Leaders have the responsibility to complete inspections in accordance with the KDOT BLP Bridge Inspection Manual and the Scope of Services for Inclusion in Local Underwater Inspection Contracts found in Appendix C.

An Underwater Inspection Team Leader shall meet all applicable requirements for Routine Bridge Inspection Team Leader and have successfully completed the FHWA-NHI-130091 Underwater Bridge Inspection course.

Pin and Hanger Inspection Team Leader

A Pin and Hanger Inspection Team Leader is required on all Pin and Hanger Inspections. It is recommended at least one other individual be present on all Pin and Hanger Inspections. All Pin and Hanger Inspection Team Leaders have the responsibility to complete inspections in accordance with the KDOT BLP Bridge Inspection Manual and the Scope of Services for Inclusion in Local Pin and Hanger Inspection Contracts found in Appendix D.

A Pin and Hanger Inspection Team Leader shall meet all applicable requirements for Routine Bridge Inspection Team Leader and have successfully completed training for ultrasonic testing of bridge pins. This training shall include, at a minimum, methods for calibrating and using ultrasonic

equipment, use of straight and angle beam transducers for detection of discontinuities, and interpreting and reporting results of testing.

Bridge Inspection Experience (per 23 CFR §650.305 Definitions)

Active participation in bridge inspections in accordance with the NBIS, in either a field inspection, supervisory, or management role. A combination of bridge design, bridge maintenance, bridge construction and bridge inspection experience, with the predominant amount in bridge inspection, is acceptable.

DISCLAIMER

No individual may be denied Bridge Inspection Team Leader status because of age, race, religion, color, sex, national origin ancestry, political affiliation or marital status. Qualification by BLP indicates that the individual has demonstrated a certain level of competence in the selected field of activity. Each individual or organization utilizing Bridge Inspection Team Leaders must make their own independent judgment of the overall competence level of their employees or contracted consultants. KDOT makes no claims regarding the abilities or competence of Bridge Inspection Team Leaders. KDOT and BLP specifically disclaim all responsibility for the actions, or the failure to act, of individuals who are, or have been, Bridge Inspection Team Leaders.

KANSAS OPEN RECORDS ACT

Information and records in possession of KDOT or BLP related to local Bridge Inspection Team Leader qualification or status are subject to the provisions and exceptions of the Kansas Open Records Act, K.S.A. 45-215 *et-seq.*

Request Form for BLP Bridge Inspection Team Leader Status

Name _____ Company _____
Address _____
City, State, Zip _____
Phone _____ Email _____

☐ **Contact Information Update Only**

Status Requested

☐ **Routine Bridge Inspection Team Leader**

- ☐ Copy of Certificate of Training for **FHWA-NHI-130055 Safety Inspection of In-Service Bridges** or **FHWA-NHI-130056 Safety Inspection of In-Service Bridges for Professional Engineers**
- ☐ Copy of Certificate of Training for **FHWA-NHI-130053 Bridge Inspection Refresher Training** (if applicable)
- ☐ Certificate letter stating the candidate's years of bridge inspection experience, if applicable, and the number of bridge inspections the candidate participated on. **This letter shall be sealed and signed by a P.E. licensed in Kansas.**

Professional Engineer (PE)

- ☐ Copy of Professional Engineer **Verification of Licensure** (applicant)

Intern Engineer (IE)

- ☐ Copy of **Intern Engineer Certificate**

OR

- ☐ Copy of transcript or diploma for **Bachelor's degree in Engineering** from an ABET accredited institution

and

- ☐ Proof of passing the NCEES Fundamentals of Engineering examination

Engineering Technician (ET)

- ☐ Copy of transcript or diploma for **associate degree in Engineering** or **Engineering Technology** from an ABET accredited institution
- ☐ Copy of Certificate for **NICET Testing for Bridge Safety Inspection (Level 3 or 4)**

☐ **Fracture Critical Member Inspection Team Leader**

- ☐ Copy of Certificate of Training for **FHWA-NHI-130078 Fracture Critical Inspection Techniques for Steel Bridges**

☐ **Underwater Inspection Team Leader**

- ☐ Copy of Certificate of Training for **FHWA-NHI-130091 or 130091(A) Underwater Bridge Inspection**

☐ **Pin and Hanger Inspection Team Leader**

- ☐ Copy of Certificate of Training for **Ultrasonic Testing of Bridge Pins** or approved equal

Please submit completed form to KDOT.BLPBridge@ks.gov with subject line "Inspection Team Leader"

DISCIPLINARY PROCEDURES

PURPOSE

The objective of having qualifications for Bridge Inspection Team Leader status is to provide accurate bridge inspections for the Kansas local system and to comply with the NBIS. Disciplinary actions are to help maintain:

- Qualified and knowledgeable bridge inspectors
- Accuracy, uniformity, and consistency in bridge inspections and data recording or input
- Maintaining complete, accurate and reliable bridge records

DISCIPLINARY PROCEDURE DEFINITIONS

Suspension: A loss of Bridge Inspection Team Leader status for a period of up to 12 months and required additional training for reinstatement.

Revocation: A loss of Bridge Inspection Team Leader status for a period of 24 months and required additional training for reinstatement or up to a permanent loss of Bridge Inspection Team Leader status with no possibility of reinstatement.

Negligence: An unintentional deviation from BLP Policies and Procedures or NBI Coding guidelines that may cause erroneous results.

Wanton: An intentional deviation from BLP Policies and Procedures and NBI Coding guidelines.

Without being exclusive, types of behavior(s) considered negligent or wanton include:

- Falsifying bridge inspection records and reports
- Falsifying bridge inspection data input in the BIP
- Failure to follow KDOT BLP Policies and Procedures
- Failure to follow the KDOT BLP Standard Scopes of Services
- Failures within one calendar year to input bridge inspection data in the BIP within 90 days of field inspections
- Failure to cooperate in an investigation concerning an allegation of negligence, wanton behavior, substandard work performance, or consistently poor performance

Substandard work performance: The failure to conduct duties in accordance with the performance guidelines found within this manual.

Consistently poor performance: More than two instances discovered over any one year's QA process of:

- Deviations of two or more on any NBI Condition Rating not supported by photographs or written documentation of observations
- Not updating applicable scour Plans of Action
- Not correcting errors in latitude and longitude coordinates
- Not correctly selecting bridge inspection frequency intervals

REPORTING ALLEGATIONS

When negligence, wanton behavior, substandard work performance, or consistently poor performance is witnessed or discovered by BLP Bridge Team members, the bridge owner, or another Bridge Inspection Team Leader, reporting documentation shall contain the following:

- Name of individual reporting the allegation (with address and phone number)
- Name of the Bridge Inspection Team Leader in question, firm represented, and name of jurisdiction where inspections were performed
- Description of alleged incident or deficiency and date occurred
- Scanned documents or photographs to document alleged negligence, wanton behavior, substandard work performance, or consistently poor performance

Submit all documentation to KDOT BLP at **KDOT.BLPBridge@ks.gov**. The Bridge Inspection Team Leader and his/her employer will be notified of alleged discrepancies or deviations from BLP bridge inspection standards by the BLP Bridge Team Leader.

REVIEW COMMITTEE

Upon receipt of an allegation of negligence, wanton behavior, substandard work performance, or consistently poor performance, it will be reviewed and investigated within 10 business days by a three-member Review Committee consisting of the following:

- BLP Bridge Team Leader
- BLP Local Bridge Engineer (Inspection)
- BLP Local Bridge Engineer (Design)

INVESTIGATION

The Review Committee may interview those involved in the incident(s) and seek documents relevant to the incident(s). It is incumbent upon the Bridge Inspection Team Leader involved, accuser(s), and their employers to cooperate with the investigation. After interviews and investigation, the Review Committee shall hold a meeting to discuss the allegation and further investigate the incident. The Bridge Inspection Team Leader and his/her employer will be notified of the time and place for the meeting and will be allowed to present evidence and respond to the allegations. After the meeting, the Review Committee shall make findings and render a decision within 10 business days concerning the Bridge Inspection Team Leader status. The Review Committee decision will be sent, via certified mail, to the accuser(s), the Bridge Inspection Team Leader, and the last known employer of the Bridge Inspection Team Leader.

INVESTIGATION OUTCOMES:

After the investigation, the Review Committee may impose the following actions:

Counseling

In the case of negligence, substandard work performance, or consistently poor performance, the BLP Bridge Team Leader may initiate counseling with the Bridge Inspection Team Leader. Discussions will include the following:

- Reasons for why meeting was requested
- Applicable examples of perceived deficiencies in office or field inspection practices
- Practical solutions and examples for improving bridge inspection techniques with a performance improvement plan to follow
- Notice that the Bridge Inspection Team Leader's work will be spot checked by the BLP Bridge Team Leader for a period not to exceed 90 days from the counseling session
- Attempts to reach an agreement on understanding of policies and procedures for bridge inspection on the Kansas local system. If no agreement can be reached, the Bridge Inspection Team Leader may request this case be sent to the Review Committee.

Suspension or Revocation

Bridge Inspection Team Leaders may lose their Bridge Inspection Team Leader status through instances of suspension or revocation.

Suspension or Revocation: Findings of negligence, wanton behavior, substandard work performance, or consistently poor performance as defined above, may result in the suspension or revocation of their Bridge Inspection Team Leader status.

For suspensions and revocations, notice will be sent via certified mail to the last known address of the Bridge Inspection Team Leader and his/her employer.

Immediate Revocation: Immediate revocation may occur in cases where, in the sole determination of the BLP Bureau Chief, an alleged infraction poses an imminent danger to the public health, safety, or welfare. In such a case, the Bridge Inspection Team Leader will be notified immediately of the revocation by the BLP Bridge Team Leader. The Bridge Inspection Team Leader, by contacting the BLP Bridge Team Leader, will be given the opportunity to appear before the Appeals Committee within 30 days. Regardless of whether a hearing is requested, an immediate revocation results in the immediate revocation of their Bridge Inspection Team Leader status. The Bridge Inspection Team Leader will not be allowed to lead bridge inspections on the Kansas local system until further notice of reinstatement from the BLP Bridge Team Leader.

APPEALS COMMITTEE

The Bridge Inspection Team Leader may request a hearing appealing the decision of the Review Committee to the Appeals Committee by emailing the BLP Bridge Team Leader at

KDOT.BLPBridge@ks.gov within 15 business days of the results of the Review Committee. The Appeals Committee will consist of the following:

- BLP Bureau Chief
- BLP Assistant Bureau Chief
- BLP Bridge Team Leader

The Appeals Committee **will not review** and such decision will be the final agency action if for any of the following actions:

- Failure to renew qualification by not taking FHWA-NHI-130053 Bridge Inspection Refresher Training, by the expiration date
- Failure to attend the annual BLP Bridge Inspection Training Course
- Acting as Bridge Inspection Team Leader while under suspension or revocation

The Appeals Committee will hold a hearing to review the Review Committee's decision. The Appeals Committee will render it decision and the decision will be sent via certified mail to the last known address of the Bridge Inspection Team Leader and their employer. The decision of the Appeals Committee is the final agency action and will be noted as such on the final outcome of the review and investigation findings.

If, after the Review and Appeals Committee processes, a suspension or revocation is warranted, the name of the Bridge Inspection Team Leader will be removed from the BLP Bridge Inspection Team Leader list until reinstated. If the Bridge Inspection Team Leader is found to have acted as a Bridge Inspection Team Leader on any Inventory, Routine, Fracture Critical Member, Underwater, or other Special Inspection during the suspension or revocation period, those inspections will be considered void and not be accepted in the BIP. The Bridge Inspection Team Leader and their employer will also be notified via certified mail of an immediate permanent revocation which will be considered the final agency action.

REINSTATEMENT

Bridge Inspection Team Leader status may be reinstated after any suspension or revocation period has been served by submitting the Request for BLP Bridge Inspection Team Leader Status form to the BLP Bridge Team Leader at KDOT.BLPBridge@ks.gov (subject line: "Reinstatement"). Include the following documents:

- For **Suspension**: A copy of the Certificate of Completion for FHWA-NHI-130053 Bridge Inspection Refresher Training taken during or after the suspension period.

- For **Revocation** of **Routine Bridge Inspection** status: A copy of the Certificate of Completion for FHWA-NHI-130055 Safety Inspection of In-Service Bridges or FHWA-NHI-130056 Safety Inspection of In-Service Bridges for Professional Engineers taken during or after the revocation period.

- For **Revocation** of **Fracture Critical Member Inspection** status: A copy of the Certificate of Completion for FHWA-NHI-130055 Safety Inspection of In-Service

Bridges or FHWA-NHI-130056 Safety Inspection of In-Service Bridges for Professional Engineers **AND** a copy of the Certificate of Completion for FHWA-NHI-130078 Fracture Critical Inspection Techniques for Steel Bridges taken during or after the revocation period.

- For **Revocation** of **Underwater Inspection** status: A copy of the Certificate of Completion for FHWA-NHI-130055 Safety Inspection of In-Service Bridges or FHWA-NHI-130056 Safety Inspection of In-Service Bridges for Professional Engineers **AND** a copy of the Certificate of Completion for FHWA-NHI-130091 or 130091(A) Underwater Bridge Inspection taken during or after the revocation period.

- For **Revocation** of **Pin and Hanger Inspection** status: A copy of the Certificate of Completion for FHWA-NHI-130055 Safety Inspection of In-Service Bridges or FHWA-NHI-130056 Safety Inspection of In-Service Bridges for Professional Engineers **AND** a copy of the Certificate of Completion for ASNT SNT-TC-1A Level I Comprehensive Ultrasonic Testing taken during or after the revocation period.

Chapter

3

STRUCTURE INVENTORY DATA

CHAPTER CONTENTS

RECORD DATA

STRUCTURE NUMBER (NBI ITEM 8) (LOCKED)

The structure number is assigned according to procedures set up by KDOT. Any structure or structures with a closed median should be considered as one structure, not two. Closed medians may have either mountable or non-mountable curbs or barriers. Since 2012, it is required by FHWA that any bridge replaced in its entirety be recorded with a new structure number.

LPA BRIDGE ID

This field is how the bridge owner commonly references the bridge in their record keeping system. Examples could be based on a grid numbering system, an on- or off-system numeric reference, or a street address of the bridge.

LPA STRUCTURE NAME

This field is used for the landmark reference of the structure such as "Bob's Bugaboo", "Old Mill Bridge", or "Quantrill's Crossing".

STATE (NBI ITEM 1) (LOCKED)

This field identifies the bridge is located in Kansas.

COUNTY (NBI ITEM 3) (LOCKED)

This field designates the county in which the bridge is located, even if the bridge is owned by an entity other than the county.

PLACE CODE (NBI ITEM 4)

Cities and towns in which the bridge is located are identified within the county using the drop-down list available.

BRIDGE GROUP (LOCKED)

This field indicates the entity with ownership responsibility.

Indicator	Description
CYG	County
PCG	City
MCA	Airport Authority
PARKS AND WILDLIFE	Kansas Department of Wildlife, Parks and Tourism

INVENTORY ROUTE (NBI ITEM 5)

The inventory route is composed of five segments.

Segment	Description
5A	Record Type
5B	Route Signing Prefix
5C	Designated Level of Service
5D	Route Number
5E	Directional Suffix

ROUTE ON/UNDER (NBI ITEM 5A) (LOCKED)

There are two types of National Bridge Inventory records: "on" and "under". Under records are divided into single route and multiple routes.

Description
Route carried on the structure
Single route goes under the structure
Multiple routes go under the structure

"On" signifies that the inventory route is carried on the structure. Each bridge structure carrying highway traffic must have a record. All NBI data items must be coded, unless specifically excepted, with respect to the structure and the inventory route on it.

"Under" signifies the inventory route goes under the structure. If an inventory route beneath the structure is a Federal-aid highway, is a Strategic Highway Corridor Network (STRAHNET) route or connector, or is otherwise important, a record must be coded to identify it. Use A, B, C, D, etc. consecutively for multiple routes on separate roadways under the same structure. STRAHNET routes shall be listed first. When this item is an under route, only the following items must be coded: NBI Items 1, 3-13, 16, 17, 19, 20, 26-30, 42, 43, 47-49, 100-104, 109 and 110. All other items may remain blank.

All route-oriented data must agree with the coding as to whether the inventory route is on or under the structure.

IDENTIFICATION

ROUTE TYPE (NBI ITEM 5B)

Identify the route signing prefix for the inventory route using the drop-down menu. When two or more routes are concurrent, the highest class of route is used. The hierarchy is in the order listed.

Description

4 County highway
5 City street
7 State lands road
8 Other (include toll roads not otherwise indicated or identified above)

SERVICE TYPE (NBI ITEM 5C)

Identify the designated level of service for the inventory route.

Description

0 None of the below
1 Mainline
2 Alternate
3 Bypass
4 Spur
6 Business
7 Ramp, Wye, Connector, etc.
8 Service and/or unclassified frontage road

ROUTE NUMBER (NBI ITEM 5D)

Record the route number of the inventory route, if available, using leading zeros to report a total of five digits. If concurrent routes are of the same hierarchy level, denoted by the route signing prefix, the lowest numbered route shall be coded. Record “00000” for bridges on roads without route numbers.

SUFFIX (NBI ITEM 5E)

Record the directional suffix to the route number of the inventory route when it is part of the route number. In some cases, letters may be used with route numbers and as part of the route numbers and not to indicate direction. In such cases, the letter should be included in the route number field.

Description

0 N/A (Not applicable)
1 North
2 East
3 South
4 West

FEATURE INTERSECTED (NBI ITEM 6A)

This item contains a description of the features intersected by the structure. When NBI Item 5A indicates an "under" record, this item describes the inventory route and/or features under the structure. There are 24 spaces allowed for the description.

The information to be recorded shall be the name or names of the features intersected by the structure. When one of the features intersected is another highway, the signed number or name of the highway shall appear first (leftmost) in the field. The names of any other features shall follow, separated by a semicolon or a comma. Parentheses shall be used to provide a second identification of the same feature. Abbreviations may be used where necessary, but an effort shall be made to keep them meaningful.

LOCATION (NBI ITEM 9)

This field gives a narrative description of the bridge location keyed from a distinguishable feature on an official highway map. Do not use features that are subject to change such as city limits, pavement types, etc.

EXAMPLES:

6 mi SW. OF RICHMOND
3.5 mi S. OF JCT. K-96

LATITUDE (NBI ITEM 16) AND LONGITUDE (NBI ITEM 17)

Record the coordinates for latitude and longitude in decimal degrees. The coordinates will automatically convert and fill in the Degrees-Minutes-Seconds field.

HIGHWAY AGENCY DISTRICT (NBI ITEM 2) (LOCKED)

This is the KDOT district in which the bridge is located.

BORDER BRIDGE (NBI ITEM 98 A&B) (LOCKED)

This item is used to indicate structures crossing borders of states. The percent responsibility for improvements to the existing structure with the neighboring state is recorded. The first three digits designate the neighboring state. The fourth and fifth digits are the percentage of total deck area of the existing bridge that the neighboring state is responsible for funding.

Segment	Description
98A	Neighboring State Code
98B	Percent Responsibility

If a neighboring state codes the structure and accepts 100% of the responsibility, Kansas still codes a record for the structure and NBI Item 98B is coded “99” to represent that neither Kansas nor the local agency has any responsibility for the structure.

BORDER BRIDGE STRUCTURE NUMBER (NBI ITEM 99) (LOCKED)

This field is the 15-digit National Bridge Inventory structure number for the neighboring State for any structure noted in NBI Item 98 - Border Bridge. This number matches the submitted NBI structure number of the neighboring state. If NBI Item 98 is blank, this item is blank.

FACILITY CARRIED (NBI ITEM 7)

This item is the route being carried by the structure. In all situations this item describes the use "on" the structure.

EXAMPLES:

MAIN STREET
COUNTY ROAD 450

BRIDGE NOTES

This field is used for recording historical information for the bridge that is not specific to an inspection. Examples of items to include in this section would be dates and levels of flood overtopping, the date the bridge was closed, a change in ownership, the date of an updated load rating, or major work done to improve the bridge. Date and initial each Bridge Note entry.

EXAMPLE

December 20, 2019 – BRIDGE CLOSED due to old age (50 years). EJL

A special inspection and Load rating was performed as a part of the Multi-year Kansas Local Bridge Rating Program (KDOT Project No. 106 C-4505-17). As a part of the program NBI condition rating were verified and updated if necessary, load rating data was updated accordingly, and basic NBI data was reviewed. See the Load Rating Report for load rating calculations and special inspection notes. – CD 1/10/2018

Emergency UW Inspection performed after 2015 flood event. Keep historical schedule for next UW. (7/15/2015 RAH)

LCB 12/02/2013- No significant indications were found on the pins this inspection. Continue ultrasonic inspection on 24 month frequency.

24 month frequency Statewide PH Inspection. BLP_MAI_04/2013.

5-28-2013 168'-216'-5 @ 240'-216'-168' SSGS, and 44'-2 @ 45' SBMS, bridge posted 12-20-34 tons, 4 OM-3's, deck has a chip seal, raveled along edges and patched areas, some spalls and popouts, rough riding, areas sound hollow, hairline cracks with efflorescence underside overhang, moderate rust and flaking at expansion joints and girder system ends, moderate abrasion and spalls to piers 8 & 9 west sides, drift at pier 5, rock protection north berm, erosion on south berm, river W to E, moderate bank erosion, vegetation & timber, UGFO east, phone and other utilities on bridge.

DAC 12-1-11 - No repairs are required on the pin and hanger joints on this bridge at this time. Continue ultrasonic inspection on the recommended two year frequency.

FUNCTIONAL DESCRIPTION

FUNCTIONAL CLASSIFICATION (NBI ITEM 26) (LOCKED)

This field is the functional classification for the inventory route as determined by KDOT and approved by FHWA.

Rural

01 Principal Arterial – Interstate
02 Principal Arterial – Other
06 Minor Arterial
07 Major Collector
08 Minor Collector
09 Local

Urban

11 Principal Arterial - Interstate
12 Principal Arterial - Other Freeways or Expressways
14 Other Principal Arterial
16 Minor Arterial
17 Collector
19 Local

NHS DESIGNATION (NBI ITEM 104) (LOCKED)

This field indicates if the route is part of the National Highway System (NHS). Bridges on the NHS require Element Level data collection. The Element Level data collection is performed by KDOT after the Routine Inspection or any other inspection where condition codes are evaluated.

STRAHNET HIGHWAY DESIGNATION (NBI ITEM 100) (LOCKED)

For the purposes of this item, the Strategic Highway Corridor Network (STRAHNET) Connectors are considered part of the STRAHNET. For the inventory route identified in NBI Item 5 - Inventory Route, the STRAHNET highway classification is as follows:

Description

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

DESIGNATED NATIONAL NETWORK (NBI ITEM 110) (LOCKED)

This field indicates if the inventory route is part of the national network for trucks as identified in the Code of Federal Regulations (23 CFR 658).

BASE HIGHWAY NETWORK (NBI ITEM 12) (LOCKED)

This field indicates if the inventory route is part of the Base Highway Network. The Base Highway Network includes the through lane (mainline) portions of the NHS, rural/urban principal arterial system, and rural minor arterial system. Ramps, frontage roads, and other roadways are not included in the Base Network.

LRS INVENTORY ROUTE, SUBROUTE (NBI ITEM 13 A&B) (LOCKED)

If NBI Item 12 - Base Highway Network has been recorded as on the Base Highway Network, the information recorded for this item is the inventory route for the State's Linear Referencing System

(LRS). If NBI Item 12 has been recorded as not on the Base Highway Network, this entire item is left blank.

The LRS inventory route and subroute numbers reported in this item correspond to the LRS inventory route and subroute numbers reported by the State for the Highway Performance Monitoring System (HPMS). The LRS inventory route number can be alphanumeric. The LRS inventory route number is not necessarily the same as that posted along the roadway, but is a number used to uniquely identify a route within at least a county and perhaps throughout Kansas.

The subroute number is a number that uniquely identifies portions of inventory route sections where duplicate milepoints occur. If these subroute numbers exist, they are identified in the HPMS-LRS records.

LRS MILEPOINT (NBI ITEM 11) (LOCKED)

The Linear Referencing System (LRS) milepoint is used to establish the location of the bridge on the Base Highway Network. It is from the same LRS Inventory Route and milepoint system as reported in the Highway Performance Monitoring System (HPMS). The milepoint recorded in this item directly relates to NBI Item 13 - LRS Inventory Route, Subroute Number.

This item is recorded for all structures located on or overpassing the Base Highway Network.

For structures carrying the LRS Inventory Route, the milepoint at the beginning of the structure (i.e. the lowest milepoint on the bridge) is recorded. When the LRS Inventory Route goes under the structure (NBI Item 5A coded "2" or A-Z), the milepoint on the underpassing route where the structure is first encountered is shown.

Milepoints may be recorded for bridges that are not located on the Base Highway Network, however NBI Item 12 - Base Highway Network is set at "Not on Base Network" for these records.

FEDERAL LANDS HIGHWAYS (NBI ITEM 105) (LOCKED)

This field indicates structures owned by State and local jurisdictions on roads which lead to and traverse through federal lands that sometimes require special coded unique identification because they are eligible to receive funding from the Federal Lands Highway Program.

TOLL (NBI ITEM 20) (LOCKED)

The toll status of the structure is indicated by this item. Interstate toll segments under Secretarial Agreement (Title 23 - United States Code - Highways Section 129 as amended by 1991 ISTEA and prior legislation) are identified separately. Use one of the following:

Description

1 - Toll bridge. Tolls are paid specifically to use the structure.
2 - On toll road. The structure carries a toll road, that is, tolls are paid to use the facility, which includes both the highway and the structure.
3 - On free road. The structure is toll-free and carries a toll-free highway.
4 - On Interstate toll segment under Secretarial Agreement. Structure functions as a part of the toll segment.
5 - Toll bridge is a segment under Secretarial Agreement. Structure is separate agreement from highway segment.

MAINTENANCE RESPONSIBILITY (NBI ITEM 21) (LOCKED)

This item is the agency responsible for the maintenance of the structure. The list below shall be used to indicate the type of agency that has primary responsibility for maintaining the structure. If more than one agency has equal maintenance responsibility, code the highest-ranking agency in the hierarchy of State, Federal, County, City, railroad, and other private.

Agency

02 County Highway Agency
03 Town/Township Highway Agency
04 City/Municipal Highway Agency
11 State Park/Forest/Reservation Agency
12 Local Park/Forest/Reservation Agency
25 Other Local Agencies
26 Private (nonrailroad)
27 Railroad
32 Local Toll Authority
80 Unknown (NBI)
Not Applicable (P) (*KDOT BLP Use Only*)
Unknown (P) (*KDOT BLP Use Only*)

OWNER (NBI ITEM 22) (LOCKED)

The list below shall be used to indicate the type of agency that is the primary owner of the structure. If more than one agency has equal ownership, record the highest-ranking agency using the hierarchy of State, Federal, county, city, railroad, and other private.

Agency

02 County Highway Agency
03 Town/Township Highway Agency
04 City/ Municipal Highway Agency
11 State Park/Forest/Reservation Agency
12 Local Park/Forest/Reservation Agency
25 Other Local Agencies
26 Private (nonrailroad)
27 Railroad
32 Local Toll Authority
80 Unknown (NBI)
Not Applicable (P) (*KDOT BLP Use Only*)
Unknown (P) (*KDOT BLP Use Only*)

HISTORICAL SIGNIFICANCE (NBI ITEM 37)

The historical significance of a bridge involves a variety of characteristics: the bridge may be a particularly unique example of the history of engineering; the crossing itself might be significant; the bridge might be associated with a historical property or area; or historical significance could be derived from the fact the bridge was associated with significant events or circumstances. Use one of the following descriptions:

Description

1 - Bridge is on the National Register of Historic Places.
2 - Bridge is eligible for the National Register of Historic Places.
3 - Bridge is possibly eligible for the National Register of Historic Places (requires further investigation before determination can be made) or bridge is on a State or local historic register.
4 - Historical significance is not determined at this time.
5 - Bridge is not eligible for the National Register of Historic Places.
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (KDOT BLP Use Only)

PARALLEL STRUCTURE (NBI ITEM 101)

Mark this item to indicate situations where separate structures carry the inventory route in opposite directions of travel over the same feature. The lateral distance between the bridges has no bearing on the recording of this item. Use one of the following descriptions:

Description

R - The right structure of parallel bridges carrying the roadway in the direction of the inventory. (For a STRAHNET highway, this is west to east and south to north.)
L - The left structure of parallel bridges. This structure carries traffic in the opposite direction.
N - No parallel structure exists.
Unknown (NBI) (*KDOT BLP Use Only*)

TEMPORARY STRUCTURE (NBI ITEM 103)

Mark this item to indicate situations where temporary structures or conditions exist. This item should be blank if not applicable.

Temporary structure(s) or conditions are those which are required to facilitate traffic flow. This may occur either before or during the modification or replacement of a structure found to be deficient. Such conditions include the following:

- Bridges shored up, including additional temporary supports.
- Temporary repairs made to keep a bridge open.
- Temporary structures, temporary shooflies or bypasses.
- Other temporary measures, such as barricaded traffic lanes to keep the bridge open.

Any repaired structure or replacement structure which is expected to remain in place without further project activity, other than maintenance, for over five (5) years shall not be considered temporary. Under such conditions, that structure, regardless of its type, shall be considered the minimum adequate to remain in place and evaluated as a permanent structure.

If this item is coded "T", then all data recorded for the structure shall be for the condition of the structure without temporary measures, except for the following eight NBI Items which shall be for the temporary structure:

Item 10 - Inventory Route, Minimum Vertical Clearance
Item 41 - Structure Open, Posted, or Closed to Traffic
Item 47 - Inventory Route, Total Horizontal Clearance

Item 53 - Minimum Vertical Clearance Over Bridge Roadway
Item 54 - Minimum Vertical Underclearance
Item 55 - Minimum Lateral Underclearance on Right
Item 56 - Minimum Lateral Underclearance on Left
Item 70 - Bridge Posting

AGE AND SERVICE

AVERAGE DAILY TRAFFIC (NBI ITEM 29)

Record the average daily traffic volume for the bridge using the inventory route identified in NBI Item 5. The ADT recorded should be the most recent ADT counts available. Included in this item are the trucks referred to in NBI Item 109 – Average Daily Truck Traffic. If the bridge is closed, record the actual ADT from before the closure occurred.

The ADT must be compatible with the other items coded for the bridge. For example, parallel bridges with an open median are recorded as follows: if NBI Item 28 - Lanes On and Under the Structure and NBI Item 51 – Bridge Roadway Width, Curb-to-Curb are recorded for each bridge separately, then the ADT must be recorded for each bridge separately (not the total ADT for the route).

AVERAGE DAILY TRUCK TRAFFIC (NBI ITEM 109)

Record the percentage of ADT (NBI Item 29 – Average Daily Traffic) that is heavy trucks. Do not include vans, pickup trucks and other light delivery trucks in this percentage.

An estimate which represents the average percentage for the category of road carried by the bridge may be used. This item may be left blank if NBI Item 29 - Average Daily Traffic is not above 100.

YEAR OF ADT (NBI ITEM 30)

This field is the year represented by the ADT in NBI Item 29. Record all four digits of the year.

YEAR BUILT (NBI ITEM 27)

This item is the year of construction of the structure. Record all four digits of the year in which construction of the structure was completed. If the year built is unknown, provide a best estimate. (See also Year Rehabilitated)

YEAR REHABILITATED (NBI ITEM 106)

This item is the year of most recent reconstruction of the structure. Record all four digits of the latest year in which reconstruction of the structure was completed. If there has been no reconstruction, record "0000".

For a bridge to be defined as reconstructed, the type of work performed, whether or not it meets current minimum standards, must have been eligible for funding under any of the Federal-aid funding categories. The eligibility criteria would apply to the work performed regardless of whether all State or local funds or Federal-aid funds were used.

Some types of eligible work not to be considered as reconstruction are listed:

-Safety feature replacement or upgrading (for example, bridge rail, approach guardrail or impact attenuators).

-Painting of structural steel.
-Overlay of bridge deck as part of a larger highway surfacing project (for example, overlay carried across bridge deck for surface uniformity without additional bridge work).
-Utility work.
-Emergency repair to restore structural integrity to the previous status following an accident.
-Retrofitting to correct a deficiency which does not substantially alter physical geometry or increase the load-carrying capacity.
-Work performed to keep a bridge operational while plans for complete rehabilitation or replacement are under preparation (for example, adding a substructure element or extra girder).

ONE OR TWO WAY TRAFFIC (NBI ITEM 102)

Record the direction of traffic of the inventory route identified in NBI Item 5 using one of the choices below. This item must be compatible with other traffic-related items such as NBI Item 28A - Lanes on the Structure, NBI Item 29 - Average Daily Traffic, NBI Item 47 – Total Horizontal Clearance and NBI Item 51 - Bridge Roadway Width, Curb-to-Curb.

Description

0 Not Highway traffic
1 1-way traffic
2 2-way traffic
3 1-lane bridge for 2-way traffic.
Unknown (NBI) (*KDOT BLP Use Only*)

SERVICE ON/UNDER THE BRIDGE (NBI ITEM 42 A&B)

The type of service on the bridge and under the bridge is indicated by these choices.

42A - Type of service on bridge

Other
1 Highway
4 Highway-railroad
5 Highway-pedestrian
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

42B - Type of service under bridge

0 Other
1 Highway, with or without pedestrian
2 Railroad
3 Pedestrian-bicycle
4 Highway-railroad
5 Waterway
6 Highway-waterway
7 Railroad-waterway
8 Highway-waterway-railroad
9 Relief for waterway
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

LANES ON AND UNDER THE STRUCTURE (NBI ITEM 28)

Record the number of lanes being carried by the structure. The number of lanes crossed over by the structure is an automatic calculation if over a road.

Segment	Description
28A	Lanes on the structure
28B	Lanes under the structure (locked - calculated)

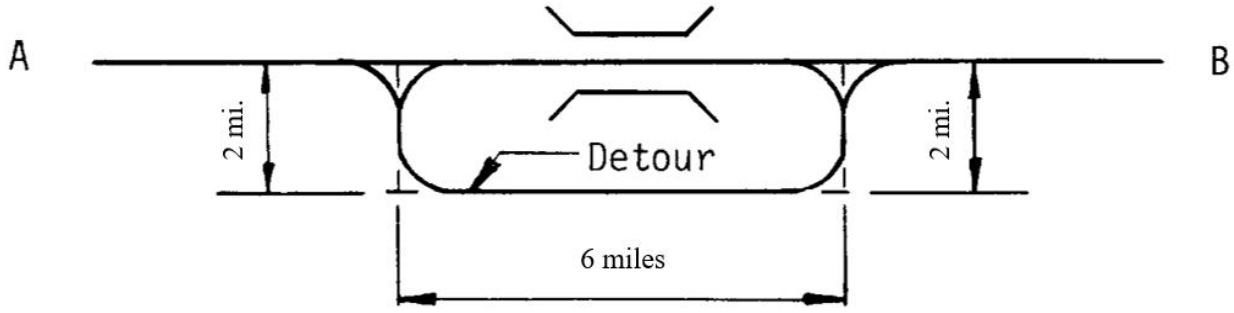
Include all lanes carrying highway traffic (i.e., cars, trucks, buses) which are striped or otherwise operated as a full width traffic lane for the entire length of the structure or under the structure by the owning/maintaining authority. This shall include any full-width merge lanes and ramp lanes and shall be independent of directionality of usage (i.e., a one-lane bridge carrying two-directional traffic is still considered to carry only one lane on the structure). It should be noted here that for the purpose of evaluating the Deck Geometry – NBI Item 68, any one-lane bridge, not coded as a ramp (NBI Item 5C = "7"), which has a Bridge Roadway Width, Curb-to-Curb – NBI Item 51 recorded as 16.0 feet or greater shall be evaluated as two lanes.

When the inventory route is on the bridge, the sum of the total number of lanes on all inventoried routes under the bridge shall be recorded. When the inventory route is under the bridge, only the number of lanes being identified by that under record shall be recorded in NBI Item 28B.

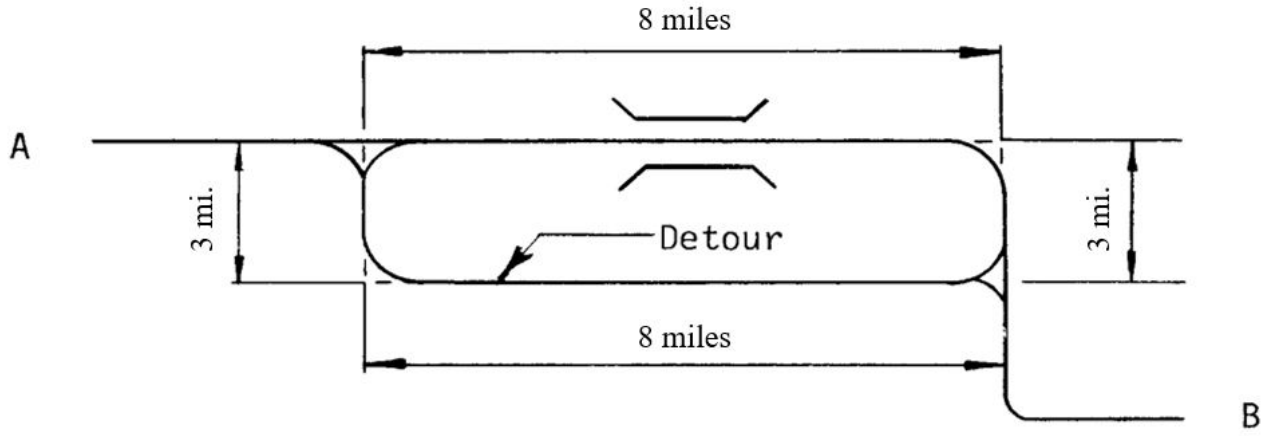
Double deck bridges may be treated as one or two structures. Either method is acceptable, however all related data must be compatible with the method selected.

BYPASS, DETOUR LENGTH (NBI ITEM 19)

Indicate the actual length to the nearest tenth of a mile of the detour length (with a decimal point). The detour length should represent the total additional travel for a vehicle which would result from closing of the bridge. The factor to consider when determining if a bypass is available at the site is the potential for moving vehicles (including military vehicles) around the structure. For instance, a bypass likely would be available in the case of diamond interchanges, interchanges where there are service roads available, or other interchanges where the positioning and layout of the ramps is such that they could be used without difficulty to get around the structure. If a ground level bypass is available at the structure site for the inventory route, record the detour length as "000.0".



Bypass, Detour Length A to B = 4 miles



Bypass, Detour Length A to B = 0 miles

If the bridge is one of twin bridges and is not at an interchange, record "001" where the other bridge can be used as a temporary bypass with a reasonable amount of crossover grading. The detour route will be established following allowable criteria determined by the governing authority. (Some authorities will not allow a designated detour over a road or bridge of lesser quality.) Record "199" for 199 miles or more, or if the bridge is on a dead-end road.

EXAMPLES:	Record
Diamond interchange, structure bypassable	0.0
Cloverleaf, not bypassable; 18 mile detour	18.0
Structure over river; 121 mile detour	121.0
Structure over highway, no interchange, bypassable at ground level	0.0
Structure on dead end road	199

POSTING

POSTING INFORMATION

NBI Item 70 (LOCKED)

This item is automatically populated from the Load Rating input on the Load Rating tab

Structure Open, Posted, or Closed to Traffic (NBI ITEM 41)

This item provides information about the actual operational status of a structure. The field review could show that a structure is posted, but NBI Item 70 - Bridge Posting may indicate that posting is not required. This is possible and acceptable recording since NBI Item 70 is based on the operating stress level and the governing agency's posting procedures may specify posting at some stress level less than the Operating Rating.

Description

A Open; no restriction
B Open; posting recommended but not legally implemented (all signs not in place or not correctly implemented)
D Open; would be posted or closed except for temporary shoring or other method to allow for unrestricted traffic
E Open; temporary structure in place to carry legal loads while original structure is closed and awaiting replacement or rehabilitation
G New structure not yet open to traffic
K Bridge closed to all traffic
P Posted for load (may include other restrictions such as temporary bridges which are load posted)
R Posted for other load-capacity restriction (speed, number of vehicles on bridge, etc.)
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)
Unknown (P) (*KDOT BLP Use Only*)

Justification

This describes if the bridge is posted and the reason.

Description

N/A – No posting present
Posted for load
Posted – Owner direction for unrestricted traffic

Type

This describes the type of sign(s) present at the bridge

Description

N/A – No posting present
R12-1
R12-5
EV
R12-5 & EV
One Truck
R12-1 & One Truck
R12-5 & One Truck
R12-5 & One Truck & EV
One Lane
R12-1 & One Lane
R12-5 & One Lane
R12-5 & One Lane & EV
Other (Specify in Notes)

Status

This describes if the posting is in place. Any incorrect signage should be described in the Posting and Signage Notes.

Description

N/A – No posting present
Posting sign(s) knocked down
Posting sign(s) missing
Posting one direction only
Posted incorrectly
Posting different by direction
Posted- multiple issues
Other (specify in notes)
Posting signs in place

SIGNAGE INFORMATION

This provides information about the posted weight limit present on the sign during the inspection. Only record information for the signs present. See Appendix F for more information on load limit posting signs

R12-1 (Gross Ton) – enter the posted weight limit on the sign
R12-5 (Three Truck) – enter the weight limit corresponding to each truck silhouette posted on the sign
Emergency Vehicle - enter the weight limit corresponding to each posted weight limit on the sign

POSTING AND SIGNAGE NOTES

This provides additional pertinent historical information on the conditions found about the posting signs. Only record information about the signs here; use note fields on other tabs for recording other information about the bridge or the inspection. Initial and date each note and add to, do not overwrite, existing notes.

LOAD RATING

METHOD USED TO DETERMINE OPERATING OR INVENTORY RATING (NBI ITEMS 63 and 65)

Indicate which load rating method was used to determine the Operation or Inventory Rating.

Method

0 Field evaluation and documented engineering judgment (tons)
1 LF Load Factor (tons)
2 AS Allowable Stress (tons)
3 LRFR Load and Resistance Factor (tons)
4 Load Testing (tons)
5 No Rating (tons)
6 Load Factor (RF)
7 Allowable Stress (RF)
8 LRFR (Load and Resistance Factor Rating) (RF)
A LFD - Assigned rating based on Load Factor Design (tons)
B ASD - Assigned ratings based on Allowable Stress Design (tons)
C LRFD - Assigned ratings based on Load and Resistance Factor Design (tons)
D LFD - Assigned rating based on Load Factor Design (RF)
E ASD - Assigned ratings based on Allowable Stress Design (RF)
F LRFD - Assigned ratings based on Load and Resistance Factor Design (RF)
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

LOAD RATINGS (NBI ITEMS 64 and 66)

These fields denote the live load carrying capacity of an existing bridge using existing plans and/or information gathered from the field. Currently the standard method is Load Factor Rating (LFR). Only the HS 20 loading shall be used to determine the Inventory Rating. Record the Operating and Inventory Rating as a three-digit number to represent the total mass in tons of the entire vehicle measured to the nearest tenth of a ton (use a decimal point). The critical rating is the corresponding truck rating that produces the lowest sufficiency rating.

Record "99.9" for a structure under sufficient fill such that, according to AASHTO design, the live load is insignificant in the structure load capacity.

DESIGN LOAD (NBI ITEM 31)

Design Live Loading

The AASHTO design live load for the most critical part of the structure is coded in this field. If the design loading is unknown, a value of "0" is recorded in this field.

Description

0 Unknown
1 M 9 (H 10)
2 M 13.5 (H 15)
3 MS (HS 15)
4 M 18 (H 20)
5 MS 18 (HS 20)
6 MS18(HS 20) +mod
7 Pedestrian
8 Railroad

9 MS22.5(HS 25) or greater
A HL 93
B Greater than HL 93
C Other
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)
Unknown (P) (*KDOT BLP Use Only*)

NBI BRIDGE POSTING (NBI ITEM 70)

The National Bridge Inspection Standards require the posting of load limits only if the maximum legal load configurations in the State exceeds the load permitted under the Operating Rating. If the load capacity at the Operating Rating is such that posting is required, this item shall be coded "4" or less. If no posting is required at the Operating Rating, this item shall be coded "5".

This item evaluates the load capacity of a bridge in comparison to the State legal load. It differs from NBI Item 67 - Structural Evaluation in that NBI Item 67 uses NBI Item 66 - Inventory Rating, while the bridge posting requirement is based on NBI Item 64 - Operating Rating.

Although posting a bridge for load-carrying capacity is required only when the maximum legal load exceeds the Operating Rating, bridge owners may choose to post at a lower level. This posting practice may appear to produce conflicting information when NBI Item 41 - Structure Open, Posted or Closed to Traffic is recorded to show the bridge as actually posted at the site and NBI Item 70 - Bridge Posting is recorded as bridge posting is not required. Since different criteria are used for reporting these two items, this reporting is acceptable and correct when the highway agency elects to post at less than the Operating Rating. NBI Item 70 shall be recorded "4" or less only if the legal load of the State exceeds that permitted under the Operating Rating.

The use or presence of a temporary bridge affects the reporting. The actual Operating Rating of the temporary bridge should be used to determine this item. However, the highway agency may choose to post at a lower level. This also applies to bridges shored up or repaired on a temporary basis.

Code	Description
4 or less	Posting required
5	No posting required

The degree that the Operating Rating is less than the maximum legal load level may be used to differentiate between codes. As a guide and for recording purposes only, the following values may be used to report this item:

Code	Relationship of Operating Rating to Maximum Legal Load
0	> 39.9% below
1	30.0 - 39.9% below
2	20.0 - 29.9% below
3	10.0 - 19.9% below
4	0.1 - 9.9% below
5	Equal to or above legal loads
Unknown (NBI)	(*KDOT BLP Use Only*)
Not Applicable (P)	(*KDOT BLP Use Only*)

This field will only print on the Inspection Report for those structures that are recorded as posted.

Structure Open, Posted, or Closed to Traffic (NBI ITEM 41) (LOCKED)

This item is automatically populated from the Posting tab.

SCHEDULE

ROUTINE INSPECTION DATE (NBI ITEM 90)

Record the date the Routine Inspection of the structure was performed. This inspection date may be different from those recorded in Item 93 - Critical Feature Inspection Date.

DATE ENTERED/RECORD DATE (LOCKED)

The Bridge Inspection Portal automatically enters the date into this field when the initial record is created.

NBI INSPECTION PERFORMED

Indicates if a Routine Inspection was performed or not.

ROUTINE INSPECTION FREQUENCY (NBI ITEM 91)

Record the number of months between designated inspections of the structure. This interval is determined by the lowest rating of the structure elements. The designated inspection interval may vary from the previous inspection depending on changes of the condition of the bridge. (See Chapter 1 - Bridge Inspection Policies, page 1.12)

Bridges will also require special non-scheduled inspections after unusual physical traumas such as floods, earthquakes, fires or collisions. These special inspections may range from a very brief visual examination to a detailed in-depth evaluation depending upon the nature of the trauma. For example, when a substructure pier or abutment is struck by an errant vehicle, in most cases only a visual examination of the bridge is necessary. After major collisions or earthquakes, in-depth inspections may be warranted. After and during severe floods, the stability of the substructure of bridges may have to be determined by probing, underwater sensors or other appropriate measures. Underwater Inspections may be required for some scour critical bridges immediately after floods. These inspections should be recorded as Other Special Inspections (NBI Item 92C).

CRITICAL FEATURE INSPECTION (NBI ITEM 92)

This field denotes critical features that need special inspections or special emphasis during inspections and the designated inspection interval in months. The designated inspection interval is set according to the condition of the bridge at the time of inspection. (See Chapter 1)

Segment	Description
92A	Fracture Critical Member
92B	Underwater Inspection
92C	Other Special Inspection

For each segment of NBI Item 92A, B, and C, mark "Y" for special inspection performed or "N" for not performed. NBI Item 92A, B, and C must be marked for all structures to designate either a yes or no answer. The bridges marked "Y" in NBI Item 92A or B are the same bridges contained in the Master Lists of Fracture Critical Member and Underwater Inspection bridges. For the inspection interval, the number of months between inspections can be marked only if the inspection performed field is marked "Y". If the inspection type required field is marked "N", the interval is left blank.

(Continued on next page)

Chapter 1 contains information on selecting an inspection interval. Current guidelines for the maximum allowable interval between inspections can be summarized as follows:

Fracture Critical Member	24 months
Underwater Inspection	60 months *
Other Special Inspections	60 months *

*The 60-month inspection interval does not apply to Routine or Fracture Critical Member Inspections. Routine and Fracture Critical Member Inspections are on a 12- or 24-month frequency. The 60-month inspection interval only applies to Underwater and Special Inspections. See Chapter 1 for guidance on Special Inspection intervals.

EXAMPLES:	Item	Mark
A 2-girder system structure which is being inspected yearly and no other special inspections are required.	92A 92B 92C	Y-12 N N
A structure where both Fracture Critical Member and Underwater Inspections are being performed on a 12-month interval. A Pin and Hanger inspection is required every four years.	92A 92B 92C	Y-12 Y-12 Y-48
A structure has been temporarily shored and is being inspected on a 12-month interval. Other special inspections are not required.	92A 92B 92C	N N Y-12
A structure has had a new load rating calculated.	92A 92B 92C	N N Y-0

Critical Feature Inspection Date (NBI Item 93)

Record the date only if a Special Inspection was performed. Record the date the last inspection of the denoted critical feature was performed. Prior inspection dates will carry forward if no change is made to the field. If NBI Item 92 is coded "N", then this item is blank. Contact **KDOT.BLPBridge@ks.gov** if the critical feature no longer requires inspection.

Segment	Description
93A	Fracture Critical Details
93B	Underwater Inspection
93C	Other Special Inspection

EXAMPLES:

A structure has fracture critical members which were last inspected on March 19, 2016. It does not require underwater or other special feature inspections.

Record: 93A 3/19/2016, 93B (blank), 93C (blank)

A structure has no fracture critical details but requires underwater inspection and has other special features (for example, a temporary support) for which the State requires special inspection. The last underwater inspection was done in April 1, 2016 and the last special feature inspection was done on November 8, 2015.

Record: 93A (blank), 93B 4/1/2016, 93C 11/8/2015

GEOMETRIC DATA

NBIS BRIDGE DEFINITION (NBI ITEM 112)

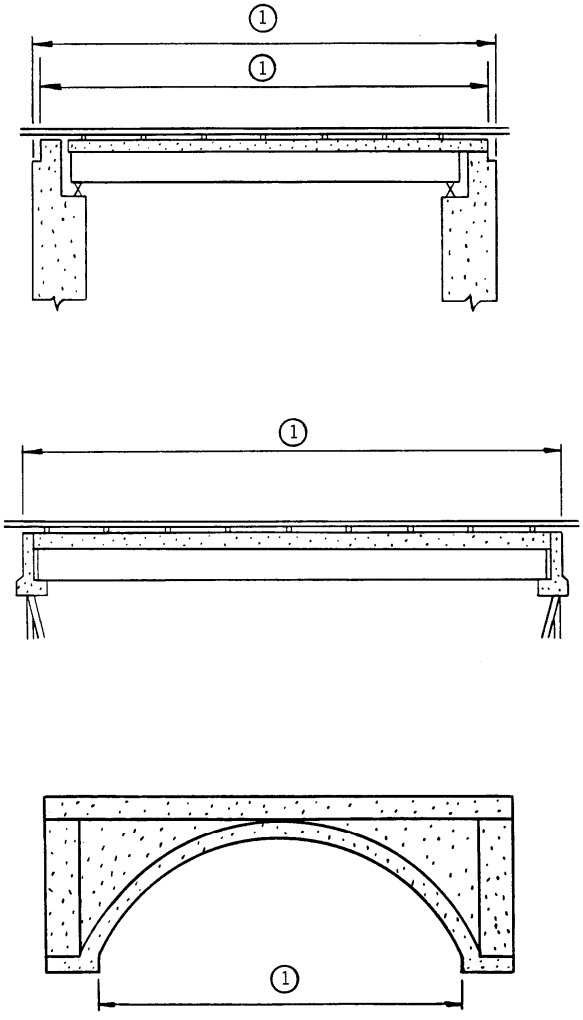
This field shows if the structure meets or exceeds the minimum length specified to be designated as a bridge for National Bridge Inspection Standards purposes using the definition of a bridge.

STRUCTURE LENGTH (NBI ITEM 49)

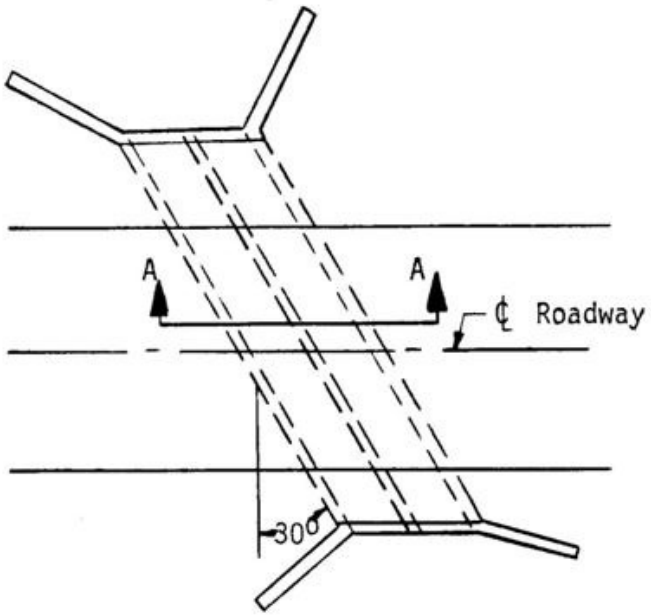
Record the length of the structure to the nearest tenth of a foot (using a decimal point). This shall be the length of roadway which is supported on the bridge structure. The length should be measured back to back of backwalls of abutments or from paving notch to paving notch. See examples below.

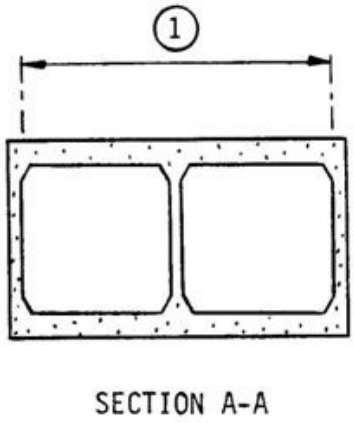
Culvert lengths should be measured along the center line of roadway regardless of their depth below grade. Measurement should be made between inside faces of exterior walls.

(1) NBI Item 49 - Structure Length

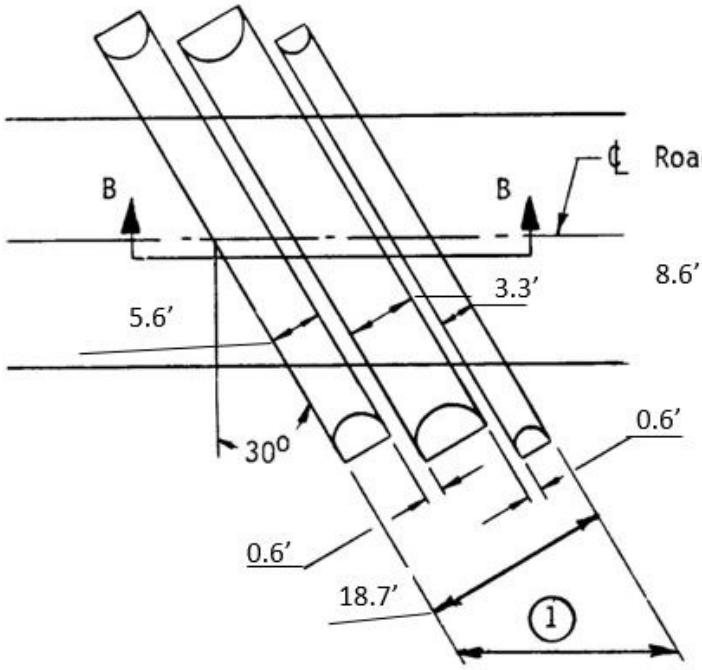


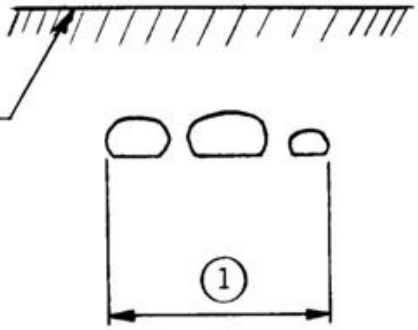
NBI Item 49-Structure Length (cont'd.)





SECTION A-A





SECTION B-B

Record

(1) NBI Item 49 - Structure Length = $\frac{18.7'}{\cos 30°}$ = 21.6'

MAXIMUM SPAN LENGTH (NBI ITEM 48)

Record the longest length of span of the structure to the nearest tenth of a foot (with a decimal point). The measurement shall be along the centerline of the bridge.

APPROACH ROADWAY WIDTH (NBI ITEM 32)

Record the normal width of usable roadway approaching the structure measured to the nearest tenth of a foot (with a decimal point). Usable roadway width will include the width of traffic lanes and the widths of shoulders where shoulders are defined as follows:

> Shoulders must be constructed and normally maintained flush with the adjacent traffic lane and must be structurally adequate for all weather and traffic conditions consistent with the facility carried.

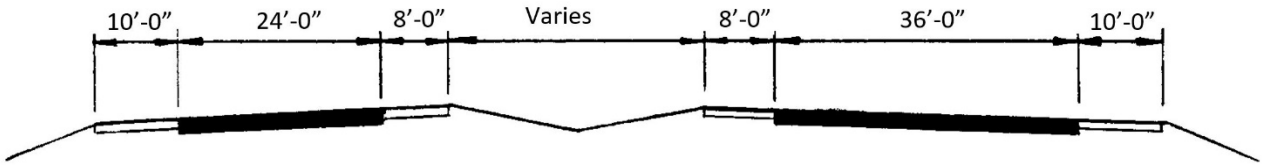
Un-stabilized grass or dirt, with no base course, flush with and beside the traffic lane is not to be considered a shoulder for this item.

For structures with medians of any type and double-decked structures, this item should be recorded as the sum of the usable roadway widths for the approach roadways (i.e., all median widths which do not qualify as shoulders should not be included in this dimension). When there is a variation between the approaches at either end of the structure, record the most restrictive of the approach conditions.

EXAMPLES:

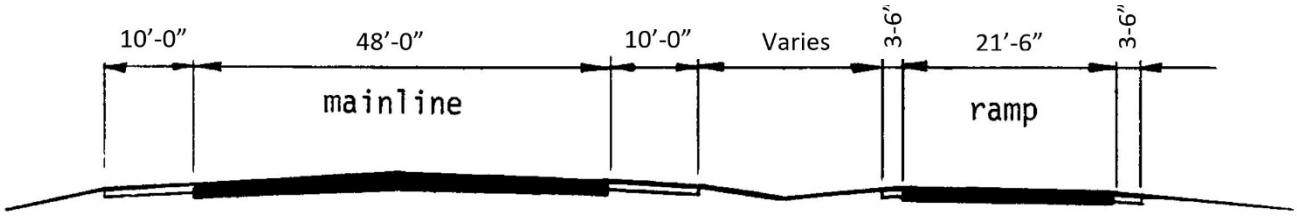
Left Shoulder	Left Roadway	Median Shoulders	Right Roadway	Right Shoulder	Record
4’-0”	-	-	16’-0”	6’-0”	26.0
6’-0”	-	-	36’-0”	12’-0”	54.0
12’-0”	47’-0”	30’-0”	47’-0”	12’-0”	148.0
10’-0“	24’-0”	16’-0”	36’-0”	10’-0”	96.0

The last example above represents the recording method for a structure in which the most restrictive approach has the cross-section shown below:



Regardless of whether the median is open or closed, the data recorded must be compatible with the other related route and bridge data (i.e., if NBI Item 51 - Bridge Roadway Width, Curb-to-Curb is for traffic in one direction only, then NBI Items 28, 29, 32, etc. must be for traffic in one direction only).

If a ramp is adjacent to the through lanes approaching the structure, it shall be included in the approach roadway width. The total approach roadway width for the example on the following page is 96.5 feet.



BRIDGE ROADWAY WIDTH, CURB TO CURB (NBI ITEM 51)

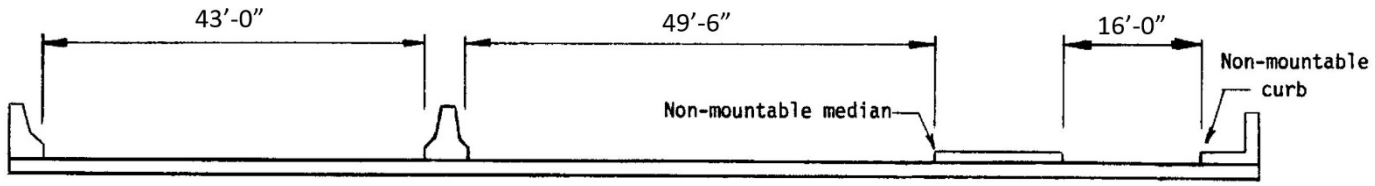
The information to be recorded is the most restrictive minimum distance between curbs or rails on the structure roadway. For structures with closed medians and usually for double decked structures, recorded data will be the sum of the most restrictive minimum distances for all roadways carried by the structure. Raised or non-mountable medians, open medians, and barrier widths are to be excluded from the summation along with barrier-protected bicycle and pedestrian lanes. The data recorded for this item must be compatible with other related route and bridge data (i.e., NBI Item 32). The measurement should be exclusive of flared areas for ramps. A four-digit number should be used to represent this distance to the nearest tenth of a foot (with a decimal point). See examples on NBI Item 50, pages 3.27-3.28.

Where traffic runs directly on the top slab (or wearing surface) of a culvert- type structure, e.g. a reinforced concrete box without fill, record the actual roadway width (curb-to-curb or rail-to-rail). This will also apply where there is minimal fill and headwalls or parapets affect the flow of traffic.

Where the roadway is on fill carried across a structure and the headwalls or parapets do not affect the flow of traffic, record "000.0". This is because the filled section simply maintains the roadway cross-section.

EXAMPLES:	Measurement	Record
Bridge Roadway Width	52'-6" wide	52.5
	70'-0" wide	70.0
	108'-6" wide	108.5

The last example above would be the recorded value for the deck section shown below.



DECK WIDTH (NBI ITEM 52)

Record the out-to-out width to the nearest tenth of a foot (with a decimal point). If the structure is a through structure, the number to be recorded will represent the lateral clearance between superstructure members. The measurement should be exclusive of flared areas for ramps.

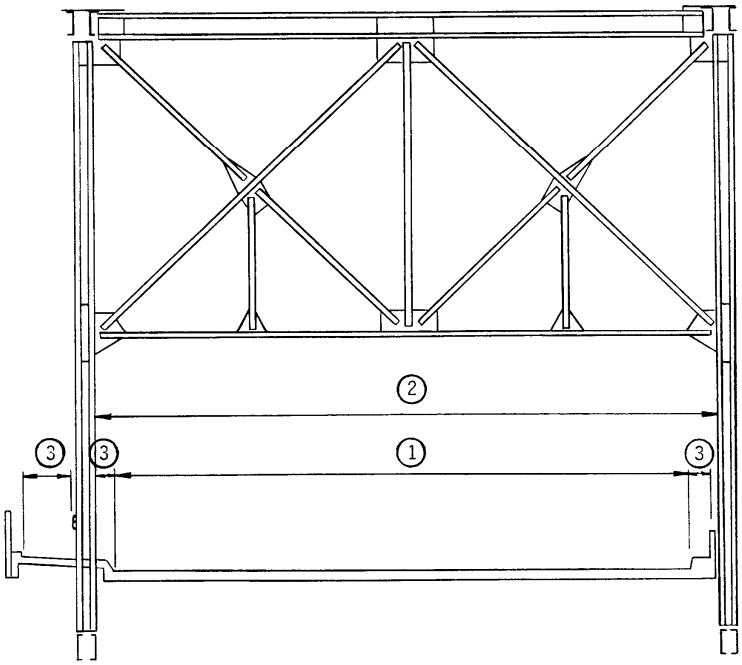
Where traffic runs directly on the top slab (or wearing surface) of the culvert (e.g., a reinforced concrete box without fill) record the actual width (out-to-out). This will also apply where the fill is minimal and the culvert headwalls affect the flow of traffic.

Where the roadway is on fill carried across a pipe or box culvert and the culvert headwalls do not affect the flow of traffic, record "000.0". This is considered proper inasmuch as a filled section over a culvert simply maintains the roadway cross-section.

LEFT/RIGHT CURB OR SIDEWALK WIDTH (NBI ITEM 50)

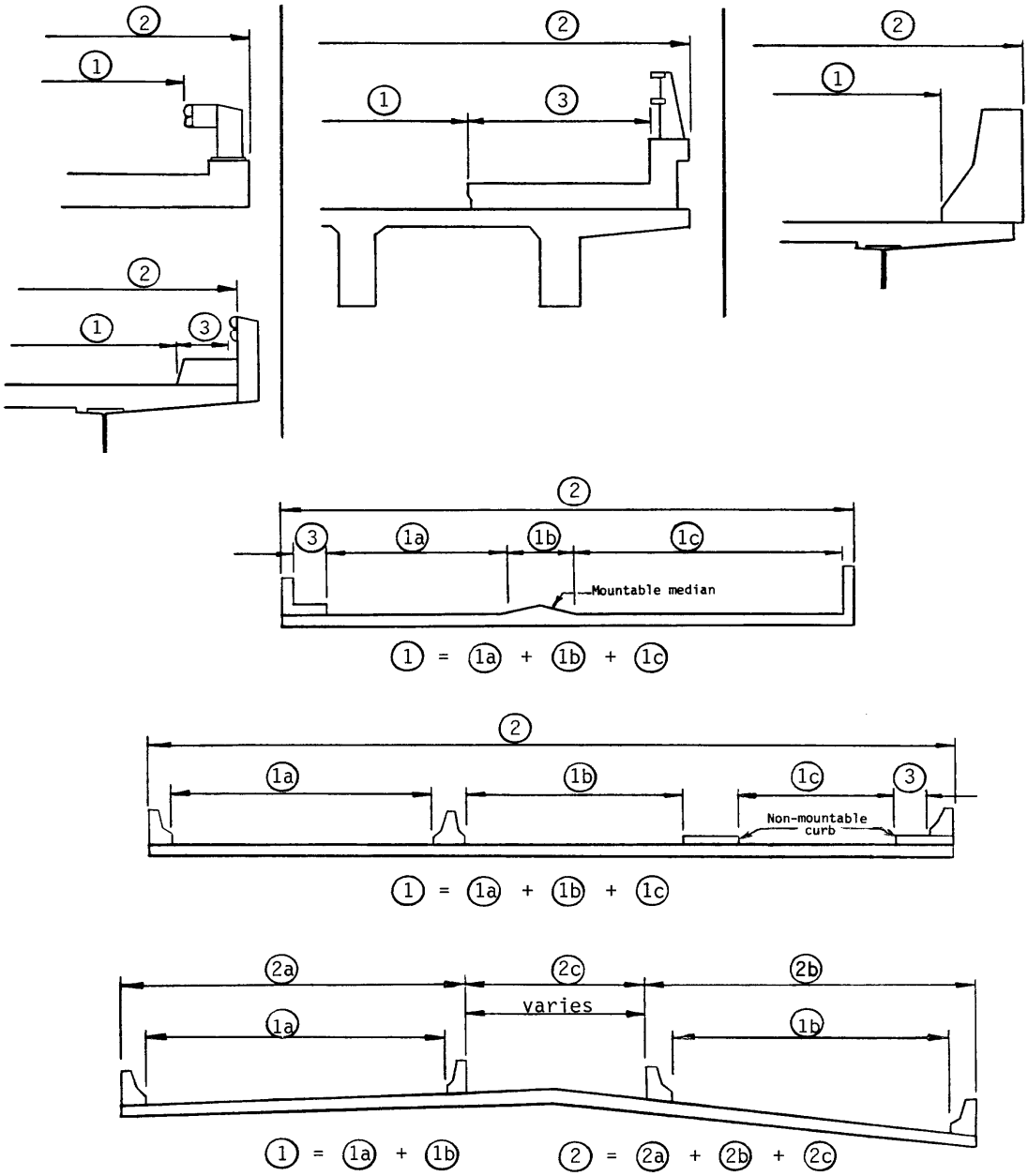
Record the widths of the left and right curbs or sidewalks to nearest tenth of a foot (with decimal points). "Left" and "Right" should be determined based on the direction of the route.

Segment	Description
50A	Left curb or sidewalk width
50B	Right curb or sidewalk width



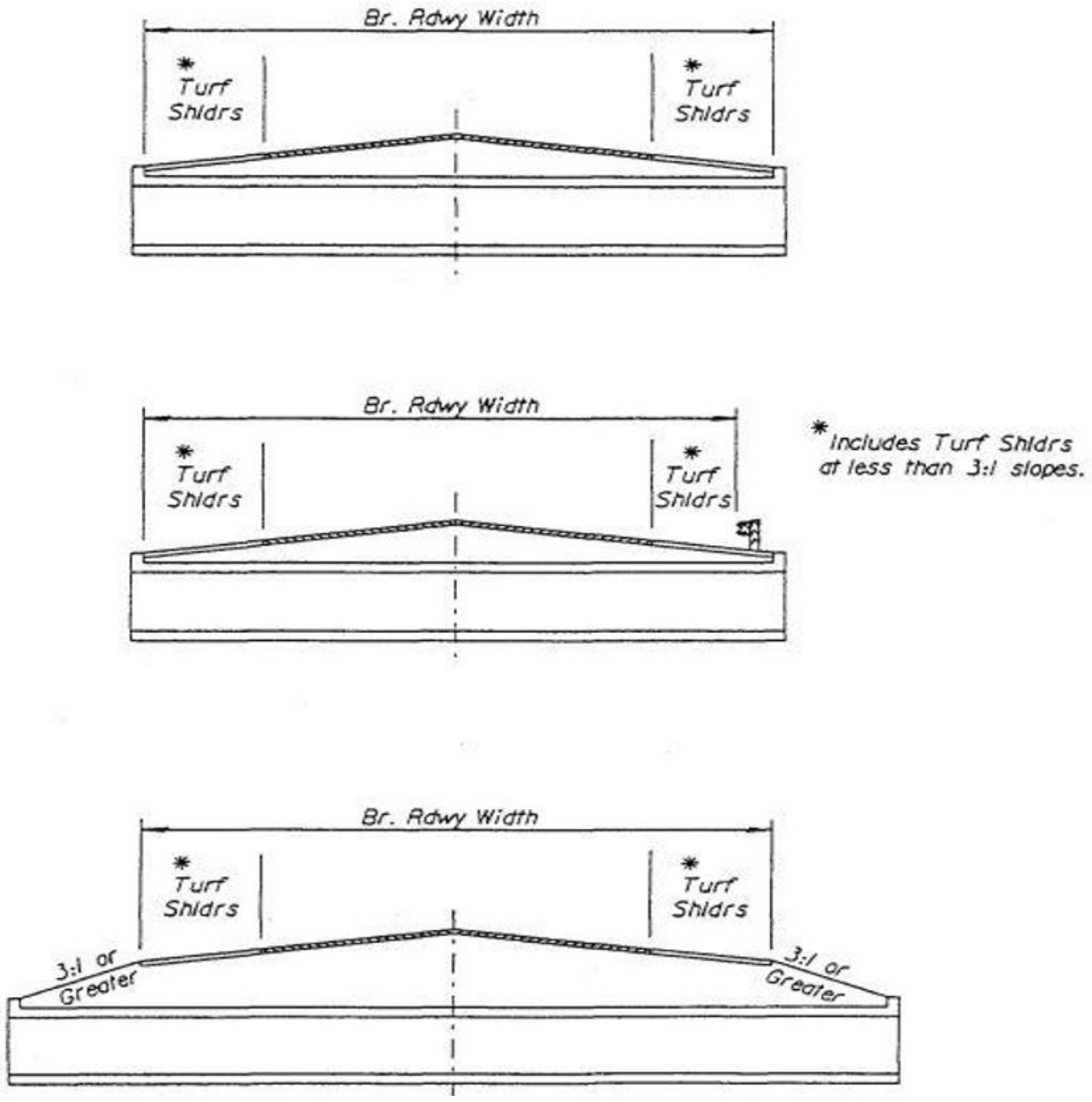
(1) NBI Item 51 - Bridge Roadway Width, Curb-to-Curb
(2) NBI Item 52 - Deck Width, Out-to-Out
(3) NBI Item 50 - Curb or Sidewalk Width

EXAMPLES:	Left Side	Right Side	Record	
Curb or sidewalk	None	7.5 feet	0.0	7.5
	10.0 feet	13.5 feet	10.0	13.5
	10.8 feet	None	10.8	0.0
	40.0 feet	37.7 feet	40.0	37.7
	None	None	0.0	0.0
	2.0 feet	5.0 feet	2.0	5.0



(1) NBI Item 51 - Bridge Roadway Width, Curb-to-Curb
(2) NBI Item 52 - Deck Width, Out-to-Out
(3) NBI Item 50 - Curb or Sidewalk Width

BRIDGE ROADWAY WIDTH



Record 0.0

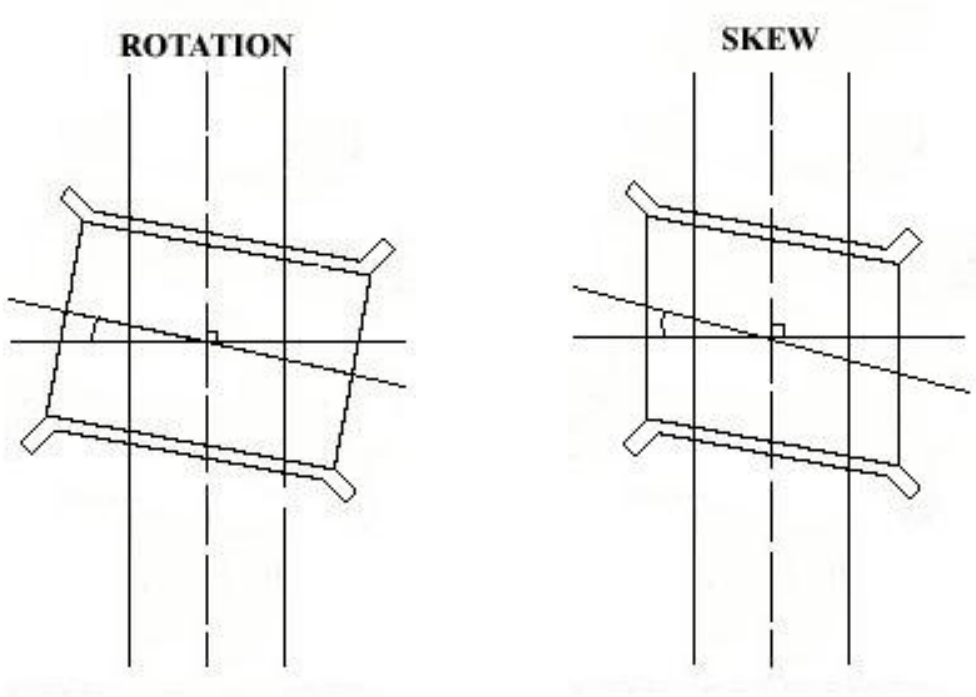
Bridge Roadway Widths, for all culvert structures shall include the pavement width plus all shoulders whether stabilized or not.

SKEW or ROTATION (NBI ITEM 34)

The skew angle is the angle between the centerline of a pier and a line normal to the roadway centerline. When plans are available, the skew angle can be taken directly from the plans. If no plans are available, the angle is to be field measured if possible. Record the skew angle to the nearest degree. If there is no skew, it should be recorded as 0 degrees. When the structure is on a curve or if the skew varies for some other reason, the average skew should be recorded, if reasonable. Otherwise, record "99" to indicate a major variation in skews of substructure units.

EXAMPLES:

Skew angle	Record
0°	0
10°	10
8°	8
Varies	99
29°	29



INVENTORY ROUTE, TOTAL HORIZONTAL CLEARANCE (NBI ITEM 47)

The total horizontal clearance for the inventory route identified in NBI Item 5 should be measured and recorded. The clearance should be the available clearance measured between the restrictive features -- curbs, rails, walls, piers or other structural features limiting the roadway (surface and shoulders). The measurement should be recorded as a three-digit number truncated (not rounded) to the nearest tenth of a foot (with a decimal point). When the restriction is 100 feet or greater, code "99.9".

The purpose of this item is to give the largest available clearance for the movement of wide loads. Flush and mountable medians are not considered to be restrictions. This clearance is defined in two ways; use the most applicable:

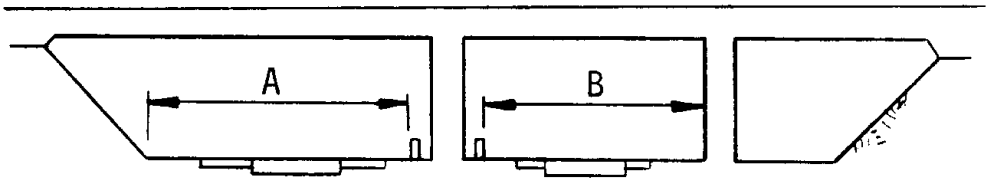
1. Clear distance between restrictions of the inventory route either “on” or “under” the structure.

2. Roadway surface and shoulders - when there are no restrictions.

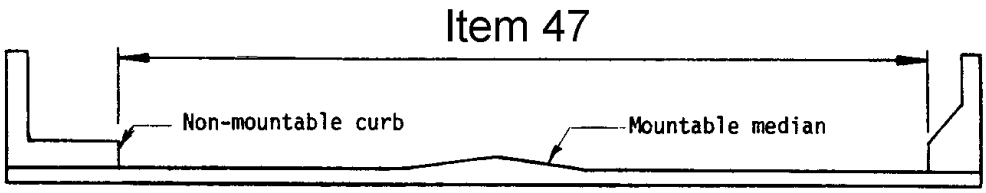
For a divided facility with a raised or non-mountable median, or an "under" route divided by piers, record the greater of the restricted widths in either direction, not both directions.

This value prints when a bridge crosses a roadway only. This field is recorded with the total horizontal clearance usable for the passage of vehicles beneath the structure. This clearance is identified as the unrestricted roadway surface plus shoulders and is measured to the nearest tenth of a foot.

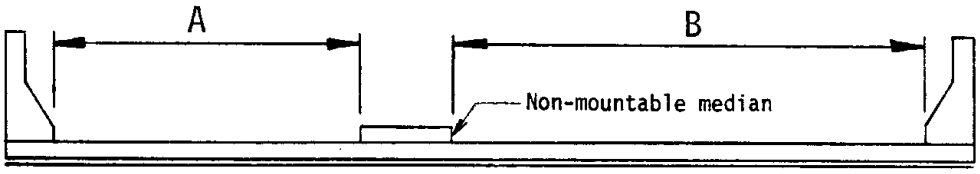
EXAMPLES:



Clearance A > B Item 47 = A



No Median or Flush or Mountable Median



Raised Median or Non-mountable Median

B > A Item 47 = B

MINIMUM VERTICAL CLEARANCE OVER ROUTE (NBI ITEM 10)

Record the minimum vertical clearance over the inventory route identified in NBI Item 5, whether the route is on the structure or under the structure. The minimum clearance for a 10-foot width of the pavement or traveled part of the roadway where the clearance is the greatest shall be recorded, truncated to the hundredth of a foot (with a decimal point). For structures having multiple openings, clearance for each opening shall be recorded, but only the greatest of the "minimum clearances" for the two or more openings shall be recorded regardless of the direction of travel. This would be the practical maximum clearance. When no restriction exists or when the restriction is 100 feet or greater, record “99.99”.

MINIMUM VERTICAL CLEARANCE OVER BRIDGE ROADWAY (NBI ITEM 53)

The information to be recorded for this item is the actual minimum vertical clearance over the bridge roadway, including shoulders, to any superstructure restriction, rounded down (truncated) to the nearest hundredth of a foot. For double decked structures record the minimum, regardless whether it is pertaining to the top or bottom deck. When no superstructure restriction exists above the bridge roadway, or when a restriction is 100 feet or greater, record “99.99”. A four-digit number should be entered to represent the clearance to the nearest hundredth of a foot (using a decimal point).

EXAMPLES:

Minimum Vertical Clearance	Record
No restriction	99.99
17.22 feet	17.22
75.45 feet	75.45
126.31 feet	99.99

BRIDGE MEDIAN (NBI ITEM 33)

This field is used only for structures with physical medians. Striped medians without some type of rail or either a mountable or non-mountable grade change shall be recorded as "No Median". All medians with curb 4 inches or more in height shall be recorded as a "Closed median with non-mountable barriers". All medians with curbs less than 4 inches in height shall be recorded as a "Closed median (no barrier/curbs)". All curbs must be 4 inches or more in height to be considered as a barrier/curb. Any bridges without medians will print "No Median". Select the appropriate description for the type of median that exists on the structure. This field is not recorded for divided twin bridges. The following types apply:

Description

0 No median
1 Open median
2 Closed median (no barrier/curb)
3 Closed median with non-mountable (>4”) barriers
Unknown (NBI) (KDOT BLP Use Only)
Not Applicable (P) (KDOT BLP Use Only)

See next page for examples.

Open Median

Closed Median

Closed Median with Non-mountable Barrier

STRUCTURE FLARED (NBI ITEM 35)

This item indicates if the structure is flared (i.e., the width of the structure varies). Generally, such variance will result from ramps converging with or diverging from the through lanes on the structure, but there may be other causes. Minor flares at ends of structures should be ignored.

MINIMUM VERTICAL UNDERCLEARANCE (NBI ITEM 54)

The minimum vertical clearance from the roadway (travel lanes only) or railroad track beneath the structure to the underside of the superstructure. (When both a railroad and highway are under the structure, record the most critical dimension.)

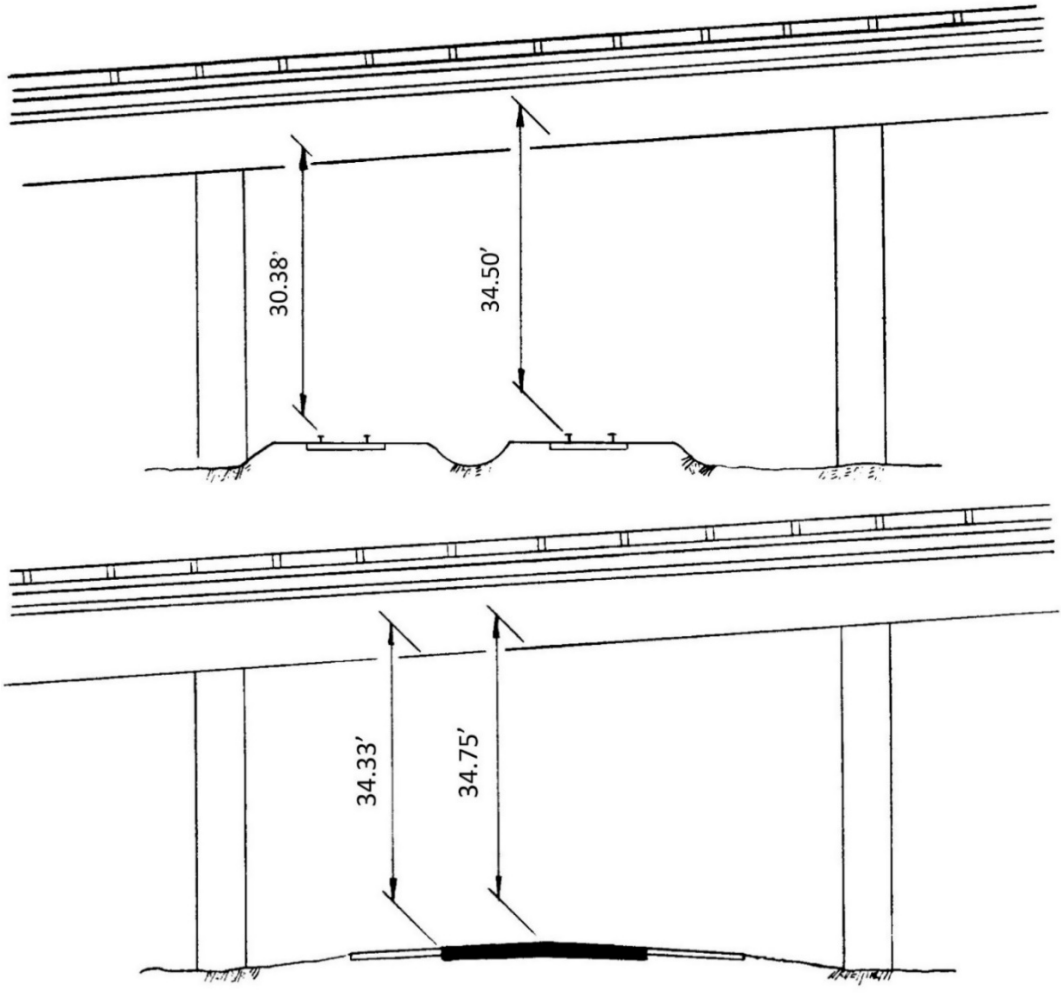
Segment	Description
54A	Reference feature
54B	Minimum Vertical Underclearance (XX.XX)

Using one of the descriptions below, record the reference feature from which the clearance measurement is taken:

Description	Record
Highway beneath structure	Hwy beneath struct
Feature not a highway or railroad	Feature not hwy or RR
Railroad beneath structure	Railroad beneath struc
Unknown (NBI)	KDOT BLP Use Only

Enter a four-digit number to represent the minimum vertical clearance from that feature to the structure, truncated to the tenth of a foot (with a decimal point). When a restriction is 100 feet or greater, code "99.9". If the feature is not a highway or railroad (such as a stream), record the minimum vertical clearance as "0.0".

EXAMPLES (see diagrams):	Record	
River beneath structure	Feature not hwy or RR	0.0
Railroad 30.38 feet beneath structure	Railroad beneath struc	30.3
Highway 34.33 feet beneath structure	Hwy beneath struct	34.3



The MUTCD, Section 2C.27, requires that the Low Clearance (W12-2) sign (see Figure 2C-5) be used to warn road users of clearances less than 12 inches above the statutory maximum vehicle

height. Any bridges in Kansas with vertical underclearances of less than 15'-0" for roadways under shall utilize the W12-2 sign.

MINIMUM LATERAL UNDERCLEARANCE ON RIGHT (NBI ITEM 55)

Record the minimum lateral underclearance on the right to the nearest tenth of a foot (with a decimal point). When both a railroad and highway are under the structure, record the most critical clearance.

Segment	Description
55A	Reference feature
55B	Minimum Lateral Underclearance

Using one of the descriptions below, record the reference feature from which the clearance measurement is taken:

Description	Record
Highway beneath structure	Hwy beneath struct
Feature not a highway or railroad	Feature not hwy or RR
Railroad beneath structure	Railroad beneath struc
KDOT BLP Use Only	Unknown (NBI)

Record the minimum lateral underclearance on the right. The lateral clearance should be measured from the right edge of the roadway (excluding shoulders) or from the centerline (between rails) of the right-hand track of a railroad to the nearest substructure unit (pier, abutment, etc.), to a rigid barrier (concrete bridge rail, etc.), or to the toe of slope steeper than 1 to 3, e.g. 1 to 1 or 2 to 1. The clearance measurements to be recorded will be the minimum after measuring the clearance in both directions of travel. In the case of a dual highway this would mean the outside clearances of both roadways should be measured and the smaller distance recorded.

If two related features are below the bridge, measure both and record the lesser of the two. An explanation should be provided as to what was recorded. When the clearance is 100 feet or greater, code “99.9”.

If the feature beneath the structure is not a railroad or highway, record “0.0” to indicate not applicable.

The presence of ramps and acceleration or turning lanes is not considered in this item; therefore, the minimum lateral clearance on the right should be measured from the right edge of the through roadway.

EXAMPLES:

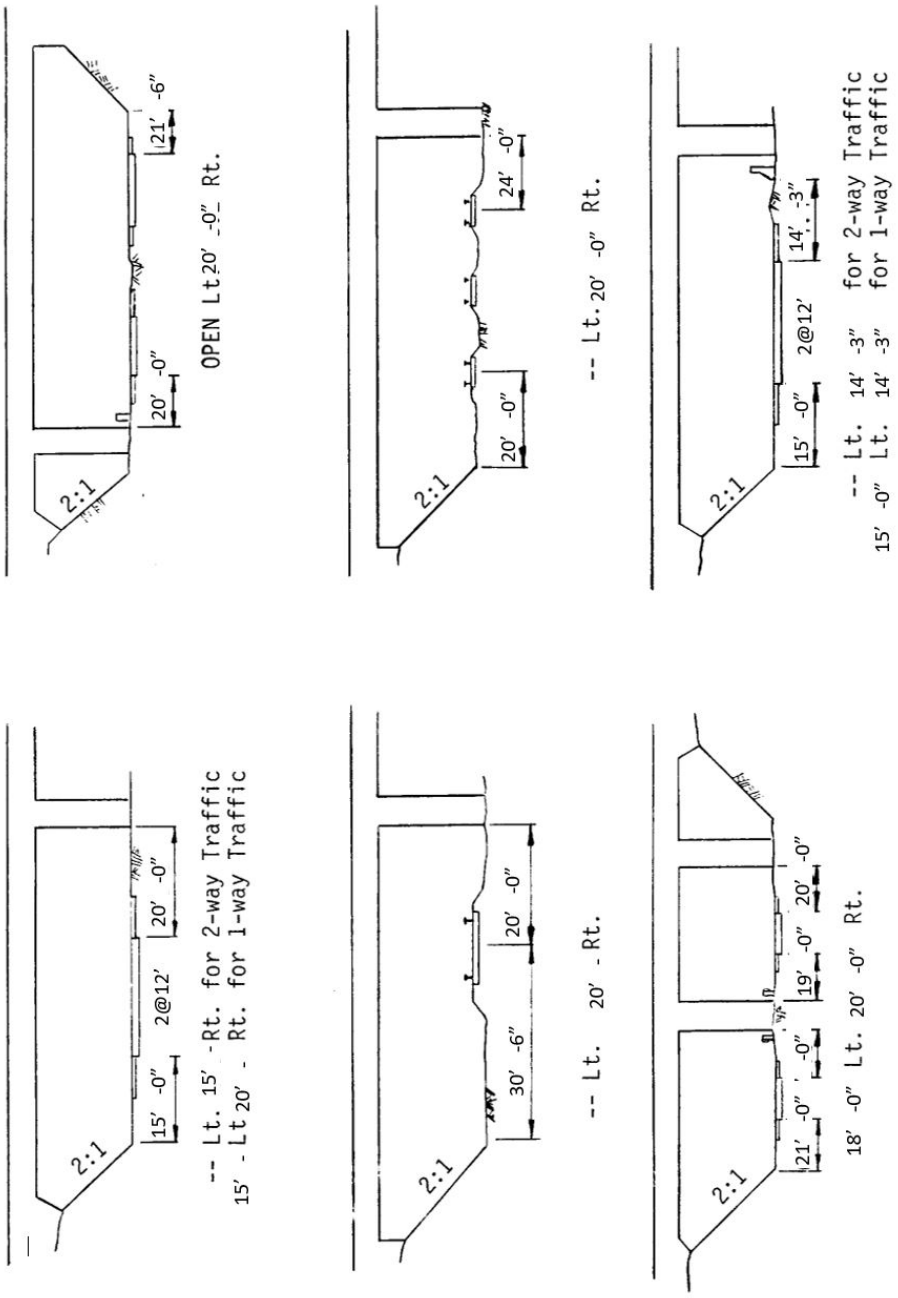
Description	Record
Railroad 20.5 feet centerline to pier	Railroad beneath struc – 20.5
Highway 20.2 feet edge of pavement to pier	Hwy beneath struct – 20.2
Creek beneath structure	Feature not hwy or RR – 0.0

See diagrams on next page.

MINIMUM LATERAL UNDERCLEARANCE ON LEFT (NBI ITEM 56)
(record only for divided highways, one-way streets, and ramps; not applicable to railroads)

Record the minimum lateral underclearance on the left (median side for divided highways) to the nearest tenth of a foot (with a 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 NBI 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. If there is no obstruction in the median area, a notation of "open" should be entered and "99.9" should be recorded. For clearances greater than 100 feet, enter "99.8". Enter "0.0" to indicate not applicable.



STRUCTURE AND MATERIALS

NUMBER OF MAIN SPANS (NBI ITEM 45)

Record the number of spans in the main or major unit. This item will include all spans of most bridges, the major unit only of a sizable structure, or a unit of material or design different from that of the approach spans.

STRUCTURE TYPE, MAIN (NBI ITEM 43)

Record the description and indicate the type of structure for the main span(s). The first entry indicates the kind of material and/or design. The next entry indicates the predominant type of design.

Segment	Description
43A	Kind of material and/or design
43B	Type of design and/or construction

43A

0 Other
1 Concrete **
2 Concrete continuous **
3 Steel
4 Steel continuous
5 Prestressed concrete *
6 Prestressed concrete continuous *
7 Wood or Timber
8 Masonry
9 Aluminum, Wrought Iron, or Cast Iron
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

* Post-tensioned concrete should be recorded as prestressed concrete.
** Concrete culverts whether single or multiple cell are to be recorded as 1-Concrete only, not 2-Concrete Continuous.

43B

Other (NBI)
01-Slab
02-Stringer/Multi-beam or Girder
03-Girder and Floorbeam System
04-Tee Beam
05-Multiple Box Beam or Girders
06-Box Beam or Girders - Single or Spread
07-Frame (except frame culverts)
09-Truss - Deck
10-Truss - Thru
11-Arch - Deck
12-Arch - Thru
19-Culvert (includes frame culverts)
20-Mixed types *
22-Channel Beam
Unknown (P) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

* Applicable only to approach spans – NBI Item 44

The following design types are available for use, but not included in the Bridge Inspection Portal. Please contact KDOT BLP if a bridge may have a design type not available.

08 Orthotropic
13 Suspension
14 Stayed Girder
15 Movable - Lift
16 Movable - Bascule
17 Movable - Swing
18 Tunnel
21 Segmental Box Girder

KANSAS STRUCTURE TYPE, FOUR-CHARACTER CODE

This field describes the overall bridge superstructure design using three segments. The first segment describes the material used, the second segment is the superstructure type, and the third is the design type. These codes are used together to form the four-character designation for the superstructure of an open span bridge. Four-character codes do not apply to bridge length culverts. Arch culvert, RCB, RFB, Rigid Frame, and Pipe structures use the first two segments to form a three-character code. See Appendix F for listing of available types.

Kansas Structure Type, Material

This field describes the type of material used. It is the first letter in the KDOT four-character code.

CODE	MATERIAL
S	Steel
W	Weathering Steel
C	Corrugated Metal
I	Wrought Iron
A	Aluminum
R	Reinforced Concrete
P	Prestressed Concrete
L	Lightweight Concrete
M	Stone Masonry
T	Timber
X	Post-Tensioned
Y	Precast

Kansas Structure Type, Superstructure

This field describes the main superstructure type for the bridge and constitutes the second and third letters of the KDOT four-character code. When bridges are widened with another structure type, record the value for the original structure.

CODE	SUPERSTRUCTURE TYPE
CS	Slab
IS	Illinois Bulletin Slab
SS	Structural Slab
VS	Voided Slab
TG	Through Girder
RG	Riveted Plate Girder
RC	Riveted Plate Girder, Comp. Design
WG	Welded Plate Girder
WC	Welded Plate Girder, Comp. Design
FG	Girder-Floorbeam System
FC	Girder-Floorbeam System, Comp. Design
SG	Girder-Floorbeam-Stringer System
SC	Girder-Floorbeam-Stringer System, Composite Design
BM	Beam
MC	Beam, Composite Design
IT	Inverted Tee Beam

CODE	SUPERSTRUCTURE TYPE
BG	Box Girder
BC	Box Girder, Composite Design
RF	Rigid Frame
GC	Rigid Frame, Composite Design
DG	Deck T-Girder or Orthotropic
DT	Deck Truss
HT	High Truss
LT	Low Truss
AR	Arch
FA	Filled Spandrel Arch
OA	Open Spandrel Arch
TA	Through Arch
CB	Box Culvert
FB	Rigid Frame Box
MP	Pipe
LP	Long Span Pipe
SP	Structural Plate Pipe

Kansas Structure Type, Design Feature

This field describes the design type used in the superstructure and is the final letter in the KDOT four-character designation.

CODE	DESIGN FEATURE
S	Simple: This type has an unrestraining support at each span end. It is designed to be unaffected by stress transmissions from other spans.
C	Continuous: Superstructure is designed to extend continuously over one or more supports.
H	Continuous and Parabolic Haunched: The superstructure members have a parabolic variation in member height. These members are continuous over one or more supports.
P	Encased: These spans have steel beams encased entirely in concrete.
F	Fixed: The superstructure members are rigidly connected to the substructure.
T	Tied: The arched superstructure members are rigidly connected by longitudinal tie beams.
D	Continuous and Drop Panel: The superstructure members have a vertical change in height. These members are continuous over one or more supports.
L	Continuous and Linear Haunched: The superstructure members have a straight-line variation in member height. These members are continuous over one or more supports.
R	Continuous and Circular Haunched: The superstructure members have a circular variation in member height. These members are continuous over one or more supports.

DECK STRUCTURE TYPE (NBI ITEM 107)

Record the type of deck system on the bridge. If more than one type of deck system is on the bridge, record the most predominant. Record "Not applicable" for a culvert or arch with the approach roadway section carried across the structure. Use one of the following:

Description
1 Concrete Cast-in-Place
2 Concrete Precast Panels
3 Open Grating
4 Closed Grating
5 Steel plate (includes orthotropic)
6 Corrugated Steel
7 Aluminum
8 Wood or Timber
9 Other
Not applicable (NBI) (*KDOT BLP Use Only*)
Unknown (NBI) (*KDOT BLP Use Only*)

KANSAS DECK STRUCTURE TYPE (For future use)

This field denotes the material that was used to make the deck of the structure. The following list indicates the predominate types in use on Kansas bridges.

Description
Steel
Weathering Steel
Corrugated Metal
Wrought Iron
Aluminum
Reinforced Concrete
Prestressed Concrete
Lightweight Concrete
Stone Masonry
Timber
Silica Fume Concrete
Reinforced Polymer
Epoxy Reinforced Top
Epoxy Reinforced All
Stainless Reinforced Concrete
Low Crack Concrete

WEARING SURFACE (NBI ITEM 108)

Information on the wearing surface and protective system of the bridge deck is recorded in three segments.

Segment	Description
108A	Type of Wearing Surface
108B	Type of Membrane
108C	Deck Protection

Type of Wearing Surface (NBI Item 108A)

Description

0 None (no additional concrete thickness or wearing surface is included in bridge deck)
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
Not Applicable (applies only to structures with no deck) (NBI) (*KDOT BLP Use Only*)
Unknown (NBI) (*KDOT BLP Use Only*)

Type of Membrane (NBI Item 108B)

Description

0 None
1 Built-up
2 Preformed Fabric
3 Epoxy
8 Unknown
9 Other
Not Applicable (applies only to structures with no deck) (NBI) (*KDOT BLP Use Only*)
Unknown (NBI) (*KDOT BLP Use Only*)

Deck Protection (NBI Item 108C)

Description

None
1 Epoxy Coated Reinforcing
2 Galvanized Reinforcing
3 Other Coated Reinforcement
4 Cathodic Protection
6 Polymer Impregnated
7 Internally Sealed
8 Unknown
9 Other
Not Applicable (applies only to structures with no deck) (NBI) (*KDOT BLP Use Only*)
Unknown (NBI) (*KDOT BLP Use Only*)

KANSAS WEARING SURFACE (For future use)

The following list indicates the predominate wearing surface types in use on Kansas bridges.

CODE	WEARING SURFACE
CONC	Concrete, Reinforced or Lightweight
CTBO	Concrete, Thin-Bonded Deck Overlay
CBDS	Concrete, Bridge Deck Surfacing
CLM	Concrete, Latex Modified
C4A	Concrete, 4A
CEXT	Concrete, Thick-Bonded Deck Overlay
CEPO	Concrete, Epoxy Covered rebar
CBDO	Concrete, Bridge Deck Overlay
WMEN	Waterproof Membrane w/ Overlay
C4WS	C4A + Concrete, Bridge Deck Wearing Surface
SFO	Silica Fume, Bridge Deck Wearing Surface
SSP	Steel, Structural Plate
GSOG	Steel, Grids Left Open
GSCF	Steel, Grids Concrete Filled
GRAV	Gravel, Stone or Earth
TIMB	Timber
CBWS	Concrete, Bridge Deck Wearing Surface
TRWS	Trap Rock Wear. Surf.
FRWS	Fiber Reinforced
POLC	Polymer Concrete,
MONO	Monolithic
BITS	Bituminous Seal (Less Than 1")
BITM	Bituminous Mat (1" or Greater)

NUMBER OF APPROACH SPANS (NBI ITEM 46)

Record the number of spans in the approach to the major bridge or the number of spans of material different from that of the major bridge.

APPROACH SPAN TYPE (NBI ITEM 44)

Indicate the type of superstructure for the approach spans to a major bridge or for the spans where the structural material is different. The codes are the same as for NBI Item 43. However, record "000" if this item is not applicable. Use code 20 (NBI Item 44B) when no one type of design and/or construction is predominate for the approach units. If the kind of material (NBI Item 44A) is varied, record the most predominant.

Segment	Description
44A	Kind of material and/or design
44B	Type of design and/or construction

44A

0 Other
1 Concrete **
2 Concrete continuous **
3 Steel
4 Steel continuous
5 Prestressed concrete *
6 Prestressed concrete continuous *
7 Wood or Timber
8 Masonry
9 Aluminum, Wrought Iron, or Cast Iron
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

* Post-tensioned concrete should be recorded as prestressed concrete.
** Concrete culverts whether single or multiple cell are to be recorded as 1-Concrete only, not 2-Concrete Continuous.

44B

Other (NBI) (KDOT BLP Use Only)
01-Slab
02-Stringer/Multi-beam or Girder
03-Girder and Floorbeam System
04-Tee Beam
05-Multiple Box Beam or Girders
06-Box Beam or Girders - Single or Spread
07-Frame (except frame culverts)
09-Truss - Deck
10-Truss - Thru
11-Arch - Deck
12-Arch - Thru
19-Culvert (includes frame culverts)
20-Mixed types *
22-Channel Beam
Unknown (P) (*KDOT BLP Use Only*)

The following design types are available for use, but not included in the Bridge Inspection Portal. Please contact KDOT BLP if a bridge may have a design type not available.

08 Orthotropic
13 Suspension
14 Stayed Girder
15 Movable - Lift
16 Movable - Bascule
17 Movable - Swing
18 Tunnel
21 Segmental Box Girder

PROPOSED IMPROVEMENTS

TYPE OF WORK (NBI ITEM 75)

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. This item is composed of two segments.

Segment	Description
75A	Type of Work Proposed
75B	Work Done by

Use one of the following descriptions to represent the proposed work type, otherwise leave blank:

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.
35 Bridge rehabilitation because of general structure deterioration or inadequate strength.
36 Bridge deck rehabilitation with only incidental widening.
37 Bridge deck replacement with only incidental widening.
38 Other structural work, including hydraulic replacements.
Unknown (P) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

If Segment 75A is blank, leave Segment 75B blank. Otherwise, Segment B shall be recorded using one of the following descriptions to indicate whether the proposed work is to be done by contract or by force account:

Description

1 Work to be done by contract
2 Work to be done by owner's forces (force account)
Unknown (NBI) (*KDOT BLP Use Only*)
Not Applicable (P) (*KDOT BLP Use Only*)

EXAMPLES:

A bridge is to be replaced by contract because it has deteriorated to the point that it can no longer carry legal loads. The same description should be used if the bridge is replaced because it is now too narrow, or the original design was too light to accommodate today's legal loads. Record 31-1

A bridge is to be replaced because the roadway must be straightened to eliminate a dangerous curve. The work will be done by contract. Record 32-1

A bridge is to be widened to increase shoulder width or the number of traffic lanes. The existing deck is in good condition and will be incorporated as is into the new structure. The work is to be done by contract. Record 33-1

A culvert is to be extended by contract to accommodate additional roadway width as part of a reconstruction contract to improve the safety of the adjacent slopes. Record 33-1

A deck is to be rehabilitated and the bridge widened to provide a full 12-foot shoulder. The existing shoulder is only a foot wide and an extra line of girders with appropriate substructure widening must be added. The work will be done by contract. Record 34-1

A bridge superstructure and substructure are to be rehabilitated by State forces to increase the bridge's load capacity. Record 35-2

A bridge deck is to be rehabilitated by contract and a safety curb to be removed which results in incidental widening of two feet. Record 36-1

A bridge deck is to be replaced by contract and the deck cantilever overhang extended two feet, which is the maximum that can be done without adding another line of stringers or girders to the superstructure. Record 37-1

A bridge which is no longer needed is to be demolished and an at-grade crossing built by State forces. (This code could also be used to designate incidental safety work on a bridge such as bridge-rail upgrading or replacement.) Record 38-2

IMPROVEMENT LENGTH (NBI ITEM 76)

Record a number that represents the length of the proposed bridge improvement to the nearest tenth of a foot (with decimal point). For replacement or rehabilitation of the entire bridge, the length should be back to back of backwalls of abutments or from pavement notch to pavement notch. For replacement or rehabilitation of only part of the structure, use the length of the portion to be improved.

For culvert improvements, use the proposed length measured along the centerline of the barrel regardless of the depth below grade. The measurement should be made between the inside faces of the top parapet or edge-stiffening beam of the top slab.

For substructure or channel work only, record the length of superstructure over, or supported by, the substructure or channel.

FUTURE ADT (NBI ITEM 114)

Record for all bridges the forecasted Average Daily Traffic (ADT) for the inventory route identified in NBI Item 5. This shall be projected at least 17 years but no more than 22 years from the year of inspection. The intent is to provide a basis for a 20-year forecast. This item may be updated anytime but must be updated when the forecast falls below the 17-year limit. If planning data is not available, use the best estimate based on site familiarity.

The future ADT must be compatible with the other items recorded for the bridge. For example, parallel bridges with an open median are coded as follows: if NBI Item 28 -Lanes On and Under the Structure and NBI Item 51 - Bridge Roadway Width, Curb-to-Curb are recorded for each bridge separately, then the future ADT must be recorded for each bridge separately (not the total for the route).

FUTURE ADT YEAR (NBI ITEM 115)

Record the year represented by the future ADT in NBI Item 114. The projected year of the future ADT shall be at least 17 years but no more than 22 years from the year of inspection.

BRIDGE COST (NBI ITEM 94)

Record a number to represent the estimated cost of the proposed bridge or major structure improvements. This cost shall include only bridge construction costs, excluding roadway, right of way, detour, demolition, preliminary engineering, etc. Record the base year for the cost in NBI Item 97 - Year of Improvement Cost Estimate. Do not use this item for estimating maintenance costs.

Each highway agency is encouraged to use its best available information and established procedures to determine bridge improvement costs. In the absence of these procedures, the highway agency may wish to use the following procedure as a guide in preparing bridge improvement cost estimates.

Apply a construction unit cost to the proposed bridge area developed by using (1) current State deck geometry design standards and (2) proposed bridge length from NBI Item 76 - Length of Structure Improvement.

ROADWAY COST (NBI ITEM 95)

Record a number to represent the cost of the proposed roadway improvement. This shall include only roadway construction costs, excluding bridge, right-of-way, detour, extensive roadway realignment costs, preliminary engineering, etc. Record the base year for the cost in NBI Item 97 - Year of Improvement Cost Estimate. Do not use this item for estimating maintenance costs.

TOTAL COST (NBI ITEM 96)

Record a number to represent the total project cost, including incidental costs not included in NBI Items 94 and 95. This item should include all costs normally associated with the proposed bridge improvement project. The Total Project Cost will therefore usually be greater than the sum of NBI Items 94 and 95. Record the base year for the cost in NBI Item 97 - Year of Improvement Cost Estimate. Do not use this item for coding maintenance costs.

COST ESTIMATE YEAR (NBI ITEM 97)

Record the year that the costs of work estimated in NBI Item 94 - Bridge Improvement Cost, NBI Item 95 - Roadway Improvement Cost, and NBI Item 96 - Total Project Cost were based upon. This date and the data provided for NBI Item 94 through Item 96 must be less than 8 years old.

Chapter

4

DECK

CONDITION RATING **(NBI ITEM 58)**

DECK CONDITION RATING – NBIS (NBI ITEM 58)

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

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, deck-girder, or T-beam, voided slab, box girder, etc.). If re-decking is required, the deck rating will affect the superstructure rating, and both ratings will usually be the same. If the structure can be rehabilitated by an overlay, the deck rating will not affect the superstructure rating, therefore, each number will usually be different. For example, a concrete slab bridge with staining on the underside of the deck will usually require re-decking, therefore, the Deck (NBI Item 58) and Superstructure (NBI Item 59) would receive the same rating. If a concrete slab bridge has map cracking or spalls on the top surface yet shows no sign of distress on the underside, the Deck would receive a lower rating than the Superstructure.

On bridges where the deck is integral with the superstructure, the superstructure condition rating may be affected by the deck condition. The converse is not true; the superstructure condition should not affect the deck condition rating. On integral bridges, the deck rating may be higher than the superstructure. (e.g., Deteriorated deck girder ends may be rated "6" or "7" with the deck in good condition rated "8". Similar conditions could exist on other integral type spans).

Non-integral decks (such as timber, steel grid, concrete on steel or prestressed beam) will not influence the superstructure rating.

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

All decks with a rating of "4" or less shall have color photographs showing the general condition of the overall deck and typical defect(s).

DECK CONDITION RATING – GENERAL (NBI ITEM 58)

CONCRETE:

Check concrete decks for cracking, scaling, spalling, leaching, chloride contamination, potholing, delamination, and full or partial depth failures, as well as other evidence of deterioration.

Always examine the underside of the deck for indications of deterioration or distress.

Note any evidence of water passing through cracks in the deck, usually indicated by white deposits on the bottom of the deck.

Observe if the concrete deck is separating from the stringers.

The Condition Rating Guidelines Sheet in Appendix F describes severity ranges for concrete cracks.

TIMBER:

Inspect for splitting, crushing, fastener failure, and deterioration from rot.

Examine timber decks for decay at contact surfaces at bearing on stringers and between layers of planking or laminated pieces.

Note any looseness in the timber deck that may have developed from inadequate nailing or where the spikes have worked loose.

Observe the timber deck under traffic for looseness or excessive deflection.

STEEL:

Check steel decks for broken welds, broken grids, section loss, and growth of filled grids from corrosion.

GENERAL:

Determine if all decks are well drained or have areas where water will pond and could affect the reasonable safe condition of the roadway.

Check drains and outlets to see that they are open.

Examine vertical and horizontal alignment of deck for indications of movement or settlement.

Examine expansion devices for movement, anchorage, connections and leakage.

Check curbs and railing for damage and deterioration.

DOCUMENT DECK DEFECTS WITH COLOR PHOTOGRAPHS

DECK CONDITION RATINGS (NBI ITEM 58)

Rating N: Not Applicable

Rating 9: New Structure - not open to traffic

Rating 8: Good Condition - no repairs needed

A. Concrete Deck

1. No significant spalling, scaling, delamination, or map cracking.
2. No water saturation.
3. Minor transverse cracking (up to 0.5 mm), very isolated.

B. Steel Deck

1. The steel decking has no rust and is tightly secured to floor system.

C. Timber Plank Deck

1. No rotten or crushed wood or no splitting of timber planks. Timber planks tightly secured to floor system.

Rating 7: Generally Good Condition

A. Concrete Deck

1. Deck cracks with or without efflorescence (up to 1.00 mm cracks) can be sealed.
2. Light scaling (1/4" depth or less).
3. Visible tire wear in the wheel paths.
4. 10% or less of the deck is stained, deteriorated, and/or hollow planed.
5. Minor surface spalls.
6. Light map cracking (up to 0.5 mm).
7. All concrete decks with a bituminous wearing surface will be rated no higher than a “7”.

B. Steel Deck

1. Minor rusting of steel deck.
2. Steel deck a little loose at some connections.

C. Timber Plank Deck

1. Minor cracking or splitting of wood.
2. Planks a little loose at some locations.

Rating 6: Fair Condition

A. Concrete Deck

1. 2% or less of the deck is spalled exposing reinforcing steel.
2. Medium scaling (1/4" - 1/2" in depth).
3. 10% - 20% of the deck is stained, deteriorating, and/or hollow planed. Note: Debonded overlays (in sound condition) cannot be rated lower than a ”6” Deck Condition Rating without some spalls, cracking > 1.0 mm, or with deck or slab bottom deterioration to warrant a lower rating.
4. Deterioration of deck edges or outlets.
5. Excessive number of open cracks (excessive being at 5-foot intervals or less over the entire deck) (1.00 to 1.50 mm).
6. Map cracking moderate (up to 1.00 mm) may soon lead to spalling.

B. Steel Deck

1. Considerable rusting of steel deck with indications of initial section loss.
2. Steel deck is loose at many locations.

C. Timber Plank Deck

1. A number of rotten or crushed planks in need of replacement.
2. Many planks are cracked or split.
3. Planks are loose at many locations.

Rating 5: Generally Fair Condition

A. Concrete Deck

1. 2% - 5% of the deck is spalled exposing reinforcing steel.
2. Excessive cracking resulting in spalling (> 1.50 mm).
3. Heavy scaling (1/2" - 1" in depth).

4. 20% - 40% of the deck is stained, deteriorating, and/or hollow planed.

5. Disintegration of deck edges or outlets.

B. Steel Deck

1. Heavy rusting of steel decking with areas of section loss.

2. Majority of steel deck is loose.

C. Timber Plank Deck

1. Numerous rotten or crushed planks in need of replacement.

2. Numerous planks cracked or split.

3. Majority of planks are loose.

Rating 4: Poor Condition

A. Concrete Deck

1. More than 5% of the deck is spalled exposing reinforcing steel.

2. 40% - 60% of the deck is stained, deteriorating, or hollow planed.

B. Steel Deck

1. Heavy rusting of steel decking resulting in considerable section loss and some holes through deck.

C. Timber Plank Deck

1. Majority of the planks are rotten, crushed or splitting, necessitating the replacement of the entire deck.

Rating 3: Serious Condition

A. Concrete Deck

1. More than 60% of the deck is stained and/or deteriorating.

2. Many full depth failures with deck plates or in need of plates placed.

3. Severe or critical signs of structural distress are visible on bridges where the deck is integral with the superstructure (i.e. - deck sagging).

B. Steel or Timber Deck

1. Severe or critical signs of structural distress are evident (i.e. - deck sagging).

Rating 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 a structural analysis is performed by a Professional Engineer licensed in Kansas or corrective action is taken. A Critical Inspection Finding is required to be filed with KDOT BLP.

Rating 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.

Rating 0: Failed Condition - out of service - beyond corrective action

Chapter

5

SUPERSTRUCTURE

CONDITION RATING **(NBI ITEM 59)**

SUPERSTRUCTURE CONDITION RATING – NBIS (NBI ITEM 59)

This item describes the physical condition of all structural members. Rate and record the condition in accordance with the 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.

In-depth inspections may be needed when signs of significant distress are noted. In some cases, partial disassembly may be required to ascertain the condition.

The inspector should verify if the bridge has fracture critical members. Fracture critical members shall receive a Special Inspection. Failure of a fracture critical member could lead to collapse of a span or the bridge (See Chapter 11 - Fracture Critical Member Inspections).

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.

In most cases, the superstructure rating should not be influenced by the deck rating. Exceptions to this would be composite or integral decks as noted in Chapter 4 (Deck Condition Rating - General). Approach spans will only apply if there are spans of differing design types or materials.

Comprehensive rehabilitation of the superstructure will normally restore the superstructure to a rating of at least "7".

All superstructure ratings of "4" or less shall have color photographs showing the general condition of the overall superstructure and typical defect(s).

SUPERSTRUCTURE CONDITION RATING – GENERAL (NBI ITEM 59)

STEEL STRINGERS AND GIRDERS:

Examine steel stringers and girders for cracking and corrosion at bearings where they support the deck and at connections.

Check flanges and webs for misalignment or damage.

Inspect weld areas for cracks, especially at re-entrant corners and copes and where vibration and movement could produce fatigue, such as flange to web welds close to separator or cross frame connections. Diaphragm connections with either open bays or offset diaphragms between girders should be checked for cracking on each side of the web.

Check for damage, section loss or rust built-up between plates and other structural members.

Examine overall paint condition.

Check bearings for excessive tipping, alignment, freezing-up, and paint condition.

CONCRETE GIRDERS AND SLABS:

Check concrete for abnormal cracking, spalling, and any deterioration or disintegration. Note location and size or extent.

Note location and size and extent of girder end cracking of concrete girders.

Investigate and document any abnormal offset to determine the cause and severity.

Concrete slabs may be inspected similar to concrete decks.

The Condition Rating Guidelines Sheet in Appendix F describes severity ranges for concrete cracks.

TIMBER STRINGERS:

Examine timber stringers for splitting, cracking, and excessive deflection.

Check timber stringers for crushing and decay at bearings and where they support the deck.

Check bridging (cross bracing) for soundness and tightness.

BEARINGS:

Check expansion bearings for free movement and that they are clear of all foreign material.

Examine concrete under bearings for cracks, spalls or deterioration.

PIN AND HANGERS:

Check all pin and hanger locations for any indication of rusting, cracking, or wear.

DOCUMENT ALL DEFECTS WITH COLOR PHOTOGRAPHS

SUPERSTRUCTURE CONDITION RATINGS (NBI ITEM 59)

Rating N: Not Applicable

Rating 9: New Structure - not open to traffic

Rating 8: Good Condition - no repairs needed

A. Concrete Superstructure

1. No significant spalling, scaling, delaminations, and no shear cracks.

B. Steel Superstructure

1. No visible rust.

C. Timber Superstructure

1. No cracking or splitting of beams or stringers.

Rating 7: Generally Good Condition

A. Concrete Superstructure

1. Hairline cracks (≤ 0.50 mm) in girders, precast panels, and other concrete members without disintegration. This cracking can include both flexure and some very isolated shear cracks.

2. For an integral structure, the Deck Rating (NBI Item 58) can dictate the superstructure evaluation.

3. Minor collision damage without corrective action required.

B. Steel Superstructure

1. Light rust and peeling paint. Some minor section loss (< 2%) in secondary members may be present.

2. Steel with new paint system and some past section loss (< 2%) in primary members.

3. Some minor cracks in secondary members may be present.

4. Minor collision damage without corrective action required.

C. Timber Superstructure

1. Minor cracking or splitting of beams or stringers at insignificant locations.

Rating 6: Fair Condition

A. Concrete Superstructure

1. Minor water saturation or light cracking of slab ends, deck girder ends, precast stems, etc.

2. 10% to 20% of the total girder ends are deteriorated or more than 20% of the ends at one span end are moderate to bad.

3. Minor flexure or shear cracks (between 0.50 and 1.0 mm) may be present.

4. For an integral structure, the Deck Rating (NBI Item 58) can dictate the superstructure evaluation.

5. Moderate damage (collision, fire, etc.) amounting to small areas of concrete broken out with reinforcing steel showing but undamaged.

B. Steel Superstructure

1. Moderate rust requiring sandblasting and painting in non-critical stress areas. No apparent section loss in primary members. (Exception: <2% for built-up primary members and 2% to 5% in secondary members) Painting is recommended.

2. Steel with new paint system and some past section loss that does not reduce the structure's load carrying capacity.

3. Moderate collision damage to major members, amounting to slight gouging, binding, or damage to secondary members requiring straightening and/or welding.

C. Timber Superstructure

1. Some decay, cracking, splitting, or crushing of beams or stringers.

D. All Types of Structures

1. Bearing devices or rockers out of alignment requiring re-alignment.

2. Bearing pads requiring replacement.

3. Frozen or rusty rockers requiring freeing and lubrication.

Rating 5: Generally Fair Condition

A. Concrete Superstructure

1. Substantial water saturation or cracking of deck girder ends, precast stems, etc.

2. 20% to 40% of the total girder ends are deteriorated or more than 40% of the ends at one span end are moderate to bad.

3. Moderate flexure or shear cracks (> 1.0 and ≤ 2.0 mm) may be present, considered to be non-critical.

4. For an integral structure, the Deck Rating (NBI Item 58) can dictate the superstructure evaluation.

5. Substantial, but not critical, damage (collision, fire, etc.) amounting to broken out concrete with some re-steel bending.

B. Steel Superstructure

1. Condition of paint is such that section loss is evident, 5% to 10% section loss to secondary members and/or < 5% section loss to primary members (Exception: 2% to 7% for built-up primary members). Contract structure painting and sandblasting is required.

2. Fatigue or out of plane cracks may be present in non-critical areas of primary members. Some secondary members may have failed, considered to be non-critical.

3. Substantial, but not critical, damage (collision, fire, etc.) to structural support elements.

C. Timber Superstructure

1. Substantial decay, cracking, splitting, or crushing of beams or stringers. Random replacement of beams or stringers required due to deterioration.

D. All Types of Structures

1. Bearing devices or rockers out of alignment or frozen resulting in damage to such devices, requiring replacement of such devices.

Rating 4: Poor Condition

A. Concrete Superstructure

1. Extensive deterioration of girders, slabs, precast units, etc.

2. More than 40% of the total girder ends are moderate to bad or more than 60% of the ends at one span end are bad.

3. Severe flexure or shear cracks (> 2.0 mm) may be present in critical areas.

4. For an integral structure, the Deck Rating (NBI Item 58) can dictate the superstructure evaluation.

B. Steel Superstructure

1. Heavy rusting amounting to > 10% section loss to secondary member or 5% section loss to primary members (Exception: > 7% for built-up primary members).

2. Fatigue or out-of-plane bending cracks may be present in critical areas.

3. Hinges may be frozen from corrosion.

C. Timber Superstructure

1. Extensive decay, cracking, splitting, or crushing of beams or stringer. Numerous beams or stringers need replacement due to deterioration.

D. All Types of Structures

1. Critical damage (collision, fire, etc.) sustained to structural support elements and precautionary measures may be needed such as temporary shoring.

2. The superstructure has shifted laterally, vertically, or horizontally resulting in bearing devices becoming jammed causing problems to superstructure.

Rating 3: Serious Condition

A. Concrete Superstructure

1. Severe deterioration of concrete.

2. For an integral structure, the Deck Rating (NBI Item 58) can dictate the superstructure evaluation.

3. Flexure or shear cracks are open in critical areas.

B. Steel Superstructure

1. Severe section loss in critical stress area.

2. Fatigue or out-of-plane bending cracks are present in critical areas.

3. Hinges are frozen from corrosion.

C. Timber Superstructure

1. Severe decay, cracking, splitting, or crushing of beams or stringers with some settlement of deck.

Rating 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 a structural analysis is performed by a Professional Engineer licensed in Kansas or corrective action is taken. A Critical Inspection Finding is required to be filed with KDOT BLP.

Rating 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.

Rating 0: Failed Condition - out of service - beyond corrective action

Chapter

6

SUBSTRUCTURE

CONDITION RATING **(NBI ITEM 60)**

SUBSTRUCTURE CONDITION RATING – NBIS (NBI ITEM 60)

This item includes the physical condition of piers, abutments, piles, fenders, footings, or other components and conditions as a result of scour, collision, or general deterioration. Rate and record the condition in accordance with the described general condition ratings.

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 the substructure (NBI Item 60) should be consistent with the one given to NBI Item 113 whenever a rating factor of **"2" or below** is determined for NBI Item 113 - Scour Critical Bridges.

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.

Comprehensive rehabilitation of substructure units will normally restore the substructure unit to at least a "7" rating. Rate and record the conditions in accordance with the described general condition ratings and the following additional descriptive codes that shall be used as a guide in evaluating the substructure condition.

The inspector should verify if the substructure has fracture critical members. Fracture critical members shall receive a Special Inspection. Failure of a fracture critical member could lead to collapse of a span or the bridge (See Chapter 11 - Fracture Critical Member Inspections).

For substructure elements with members continually underwater and inaccessible for ordinary inspection, an Underwater Inspection shall be required. All substructure members in the channel at the time of inspection should be reported (document in writing and with color photographs). Channel scour near a substructure member can affect both the Channel (NBI Item 61) and Substructure condition rating. See "Channel and Substructure Ratings as a Result of Scour" detail in this chapter for the influence of scour on the substructure rating. If a low substructure condition rating cannot be verified visually in the field, the inspector shall complete the following steps:

- Check for past Underwater Inspection reports and review their findings.
- Look for signs of recent repairs completed and document any found.
- Document the present conditions found (in writing and with color photographs).

All substructure ratings of "4" or less shall have color photographs showing the general condition of the overall substructure and typical defect(s).

SUBSTRUCTURE CONDITION RATING – GENERAL (NBI ITEM 60)

ABUTMENTS, BENTS, PIERS, AND RETAINING WALLS:

All Underwater Inspection reports should be checked prior to making any substructure condition rating changes.

Check for scour and undermining.

Check for earth pressure against substructure units causing unstable conditions.

Examine all units for movement or settlement. Measure any misalignment, bends or kinks.

Check condition of concrete for deterioration and cracks.

Observe steel encased in concrete at the point of encasement.

Check masonry for displacement and loose and missing mortar and stones.

Check timber piles for decay, especially in areas that are alternately wet and dry.

Examine contact surfaces of timber.

Check timber caps for crush and excessive deflection under heavy loads.

Observe caps for rotational movement.

Check all exposed piles for deterioration.

Examine condition of riprap.

The Condition Rating Guidelines Sheet in Appendix F describes severity ranges for concrete cracks.

SUBSTRUCTURE CONDITION RATINGS (NBI ITEM 60)

Rating N: Not Applicable

Rating 9: New Structure - not open to traffic

Rating 8: Good Condition - no repairs needed

A. Concrete Substructure

1. No significant spalling, scaling, delaminations, and no shear cracks.

B. Steel Substructure

1. No visible rust.

C. Timber Substructure

1. No cracking or splitting of piles or beams.

Rating 7: Generally Good Condition

A. Concrete Substructure

1. Minor deterioration or initial disintegration, minor water saturation, cracking (> 0.5 to ≤ 1.5 mm) with some leaching, or spalls on concrete or masonry unit with no effect on bearing area.

B. Steel Substructure

1. Minor rust with no peeling.
2. Minor damage to secondary members.

C. Timber Substructure

1. Insignificant decay, cracking, splitting or crushing of timber.

D. All Types of Structures

1. Abutment seats or bent caps need cleaning.
2. Loose and/or missing anchor bolts and nuts.
3. Minor berm erosion, concrete riprap requires minor maintenance.

Rating 6: Fair Condition

A. Concrete Substructure.

1. Moderate deterioration or disintegration, spalls, cracking (>1.5 to ≤3.0 mm full length) and leaching with some loss of bearing area.

B. Steel Substructure

1. Peeling of rusted areas just beginning to develop resulting in slight section loss.

2. Damage or deterioration of secondary members requiring repair or replacement.

C. Timber Substructure

1. Significant decay, cracking, splitting, or crushing requiring replacement of a few members.

D. All Types of Substructure

1. Substructure movement causing abutments or bents to become slightly out of plumb.

2. Major berm erosion due to poor drainage off bridge ends requiring backfilling, slope protection, drainage channeling, etc.

3. Moderate scour around substructure elements requiring backfilling and possibly mudjacking. See "Channel and Substructure Ratings as a Result of Scour" detail.

4. Riprap cracking, bulging, or sliding requiring repair.

Rating 5: Generally Fair Condition

A. Concrete Substructure

1. Many concrete or masonry units show substantial loss with exposed reinforcing steel.

2. Broken backwalls.

3. Spalls due to ice damage or other damage (collision, fire, etc.).

4. Full length cracks 3.0 to 5.0 mm.

B. Steel Substructure

1. Heavy rusting resulting up to 5% loss of section of major members.

2. Minor bending of piles due to ice or other damage (collision, fire, etc.).

C. Timber Substructure

1. Substantial decay, cracking, splitting, or crushing requiring replacement of up to 25% of the timber members.

2. Timber abutment needs to be tied to deadman anchors to stabilize bowing or shifting of backwall due to earth pressure.

D. All Types of Substructures

1. Substructure out of alignment requiring contract work to correct problem.

2. Major scour resulting in the exposure of portions of bottom footings or piles. See "Channel and Substructure Ratings as a Result of Scour" detail.

3. Riprap failed requiring replacement.

Rating 4: Poor Condition

A. Concrete Substructure

1. Structural cracks in concrete and masonry units requiring complete replacement or major patching to put back in shape.

2. Major concrete spalls due to ice damage or other damage, (collision, fire, etc.).

B. Steel Substructure

1. Section losses up to 10% on major members due to deterioration.

2. Piles bent due to ice damage or other damage (collision, fire, etc.).

C. Timber Substructure

1. Major decay, cracking, splitting, or crushing requiring replacement between 26% to 50% of the timber members per bent.

2. Severe bow of abutment backwalls due to earth pressure requiring abutment to be replaced.

D. All Types of Substructures

1. Severe scouring or undermining of footings that affects the stability of the unit requiring corrective action. Minor settlement of the structure may have occurred. See "Channel and Substructure Ratings as a Result of Scour" detail.

Rating 3: Serious Condition

1. Any condition described in "Rating 4", but with further deterioration.

2. Blocking and shoring considered necessary (not just precautionary) to maintain the safety and alignment of the structure.

Rating 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 a structural analysis is performed by a Professional Engineer licensed in Kansas or corrective action is taken. A Critical Inspection Finding is required to be filed with KDOT BLP.

Rating 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.

Rating 0: Failed Condition - out of service - beyond corrective action

KANSAS DEPARTMENT OF TRANSPORTATION
CHANNEL AND SUBSTRUCTURE RATINGS
AS A RESULT OF SCOUR

SUBSTRUCTURE INFORMATION

KANSAS PIER AND ABUTMENT TYPES

The following list is used to describe the various types of piers and abutments.

PIER OR ABUTMENT TYPE (For future use)

Cap (Pier or Abutment)
Pile Bent (Pier)
Pile Bent Concrete Encased (Pier)
Rocker Bent (Pier)
Column Bent (Either)
Column Bent with Web Wall (Either)
Frame Bent (Pier)
Frame Bent with Web Wall (Pier)
Solid (Pier)
Cantilever (Pier)
Pedestal or Stub (Abutment)
U-Type (Abutment)
Single Column (Pier)
N/A (Boxes, pipes, and arches constructed monolithically do not have substructure members.)

KANSAS PIER AND ABUTMENT FOOTING TYPES (For future use)

The following list is used to describe the various types of footings used for piers and abutments.

FOOTING TYPE

Footings, Spread
Pile, Steel H
Pile, Drilled Shaft Concrete Filled
Pile, Steel Shell
Pile, Timber
Pile, Prestressed Concrete
Pile, Precast Concrete
Pile, Pressure Grouted Concrete

KANSAS BERM PROTECTION (For future use)

The following list is used to describe the various types of berm protection used.

PROTECTION TYPE

Reinforced Earth Concrete Retaining Wall
Concrete Riprap
Rock-filled Gabions
Fiberglass and Asphalt
Bag Crete
Laid-up Rock or Masonry
Steel Bin Retainer
Concrete Posts
Rock Riprap or Broken Concrete
Rock Ledge (Natural)
Earth Berms
No Berms

Chapter

7

CULVERT

CONDITION RATING **(NBI ITEM 62)**

CULVERT CONDITION RATING – NBIS (NBI ITEM 62)

This item evaluates the alignment, settlement, joints, structural condition, scour, and other items associated with culverts. The rating 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.

Multiple pipes, arches, or box culverts may be a bridge. Chapter 1 explains how to measure culverts for bridge length.

A concrete box culvert, whether Reinforced Concrete Box (RCB), Reinforced Concrete Rigid Frame Box (RFB), or Reinforced Concrete Rigid Frame (RRF), are to be coded as "Concrete" (NBI Item 43A=1) as opposed to "Concrete Continuous" regardless of how many cells (barrels) are present (refer to Chapter 3, NBI Item 43 - Structure Type, Main).

The descriptive codes in this chapter shall be used as a guide in evaluating the culvert condition. For a detailed discussion regarding the inspection and rating of culverts, consult Report No. FHWA-IP-86-2, Culvert Inspection Manual, July 1986.

All culvert ratings of "4" or less shall have color photographs showing the general condition of the overall culvert and typical defect(s).

CULVERT CONDITION RATING – GENERAL (NBI ITEM 62)

Check for scour and undermining. Look for water flow going under the structure.

Check for earth pressure against walls causing unstable conditions.

Examine any evidence of movement or settlement. Measure any separation, misalignment, bends, or kinks.

Check condition of concrete for deterioration and cracks. The Condition Rating Guidelines Sheet in Appendix F describes severity ranges for concrete cracks.

Make special note of horizontal wall cracks in barrel.

Check for seepage through construction joints.

DOCUMENT ALL DEFECTS WITH COLOR PHOTOGRAPHS

CULVERT CONDITION RATINGS (NBI ITEM 62)

Rating N: Not Applicable.

Rating 9: New Structure - not open to traffic.

Rating 8: Good Condition - no repairs needed.

1. Use this rating when you can see some items that will need some minor maintenance in the future but nothing now.
2. Metal culverts have smooth symmetrical curvature with only superficial corrosion and no pitting.

Rating 7: Generally Good Condition

1. Minor cracking or scaling of concrete (including wings and wing-barrel junctions).
2. Minor joint leakage between barrel sections.
3. Minor settlement or misalignment (< 1").
4. Minor collision damage.
5. Hairline horizontal barrel cracks (> 0.20 to ≤ 0.5mm) may be present in walls.
6. 5 - 10% ceiling deterioration, staining, cracking, etc.
7. Metal culverts have smooth symmetrical curvature top half but minor flattening of bottom. Only superficial corrosion and slight pitting.

Rating 6: Fair Condition

1. Moderate cracking, scaling, spalling, or deterioration of concrete with some reinforcing steel exposed. > 10 ≤ 20% ceiling deterioration.
2. Minor to moderate horizontal barrel cracks (> 0.5 and ≤ 2.00 mm and full length) may be present in walls.
3. Open cracks between wingwall and barrel.
4. Moderate joint leakage between barrel sections causing deterioration of concrete.
5. Moderate settlement or misalignment (1" - 3").
6. Collision damage amounting to small areas of broken out concrete with reinforcing steel showing but undamaged.

7. Metal culverts have smooth curvature top half, but bottom has flattened significantly. Significant corrosion or moderate pitting. Evidence of backfill infiltration through seams or joints.

Rating 5: Generally Fair Condition

1. Heavy cracking, scaling, spalling, or deterioration of concrete exposing large areas of reinforcing steel. Ceiling deterioration between 20 - 40%.
2. Severe horizontal barrel cracks (> 2.00 and ≤ 4.00 mm full length, no bow) in walls. Cracks appear to be opening.
3. Wingwall failed and completely separated from box.
4. Heavy leakage through joints between sections resulting in undermining of the culvert or road section.
5. Considerable settlement or misalignment (3" - 6").
6. Collision damage amounting to large areas of broken out concrete with reinforcing steel exposed and damaged.
7. Metal culverts have significant distortion at isolated locations in top half and extreme flattening of invert. Deflection of pipe caused by backfill infiltration. Significant corrosion or deep pitting.

Rating 4: Poor Condition

1. Heavy cracking, scaling, spalling, or deterioration of concrete exposing large areas of reinforcing steel. Ceiling deterioration > 40%.
2. Holes may exist in walls, slab, or floor.
3. Severe horizontal barrel cracks (> 4.00 mm, visible bow) in walls.
4. Severe settlement or misalignment which may be causing loss of fill.
5. Metal culverts have marginal significant distortion throughout length of pipe, lower third may be kinked. Extensive corrosion or deep pitting.

Rating 3: Serious Condition

1. Similar conditions as "Rating 4", except in the opinion of the inspector, repair work needs to be done to stabilize the condition so that it does not threaten the integrity of the culvert.
2. Severe scour or erosion at curtain walls, wingwalls, or pipes.
3. Metal culverts have extreme deflection at isolated location or flattening of crown. Extensive corrosion or deep pitting with scattered perforations.

Rating 2: Critical Condition - It is strongly recommended that the facility should be closed until the indicated repair is completed, or until a structural analysis is performed by a Professional Engineer licensed in Kansas. A Critical Inspection Finding is required to be filed with KDOT BLP.

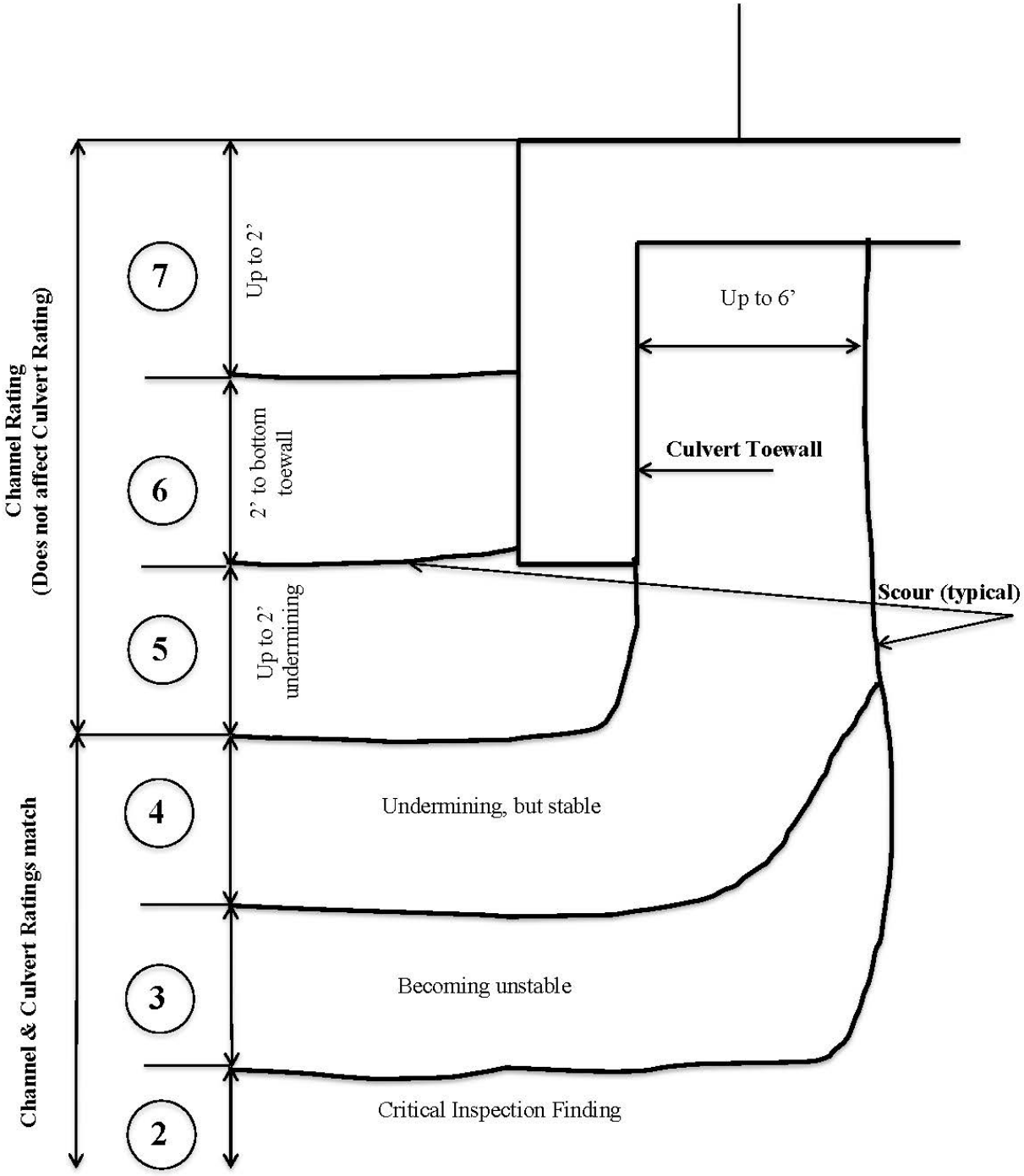
1. Similar conditions as "Rating 4", except in the opinion of the inspector, the integrity of the culvert is threatened, and therefore the culvert should be closed until the indicated repair, rehabilitation, or replacement is complete.

Rating 1: Critical Condition - facility is CLOSED. Study should determine the feasibility for repair, replacement, or removal.

Rating 0: Critical Condition - facility is CLOSED and beyond repair.

**** For culvert ratings due to scour, see "Channel and Culvert Ratings as a Result of Scour"**

Channel and Culvert Ratings as a Result of Scour



Note:
1) Culvert/Channel rating applies to worst case at either "entrance" or "exit" end of culvert.
2) Scour must be full width of the opening.
3) Unstable wings due to scour will lower culvert rating to a "7" and a channel rating to a "6".
4) Failed wings due to scour will lower culvert rating to a "6" and a channel rating to a "6".

Chapter

8

CHANNEL

CONDITION RATING **(NBI ITEM 61)**

CHANNEL CONDITION RATING –NBIS (NBI ITEM 61)

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. Berm riprap is evaluated and rated as part of the Substructure Condition Rating (NBI Item 60). The inspector should be 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 (and documented with color photographs) but not included in the condition rating and its removal recommended.

Channel scour near a substructure member can affect both the channel and substructure member or culvert ratings. Refer to "Channel and Substructure Ratings as a Result of Scour" sheet in Chapter 6 or "Channel and Culvert Rating as a Result of Scour" in Chapter 7 for the actual effect of scour on the channel rating. If a low channel rating cannot be verified visually in the field, the inspector shall complete the following steps:

- Check for past underwater inspection reports and their findings.
- Look for signs of recent repairs completed and document any found.
- Document the present conditions found (in writing and with color photographs).
- Question current rating and request the reviewer to check bridge files.

All channel ratings of "4" or less shall have color photographs showing the general condition of the overall channel and typical defect(s).

DOCUMENT ALL DEFECTS WITH COLOR PHOTOGRAPHS

CHANNEL CONDITION RATINGS (NBI ITEM 61)

Rating N: Not Applicable - use when bridge is not over a waterway

Rating 9: Not used

Rating 8: Good Condition - no repairs needed

1. Channel alignment is good and stream is stable.
2. Bank and channel are relatively free of brush or drift - does not restrict flow under bridge.

Rating 7: Generally Good Condition

1. Bank and/or channel have brush, trees, or minor scour that may cause some minor flow problems. Refer to "Channel and Substructure Ratings as a Result of Scour" detail in Chapter 6 or "Culvert/Channel Rating" in Chapter 7.
2. One foot of scour at RCB toewalls.
3. RCB wings require more fill.
4. Cross sectional area of barrel opening 10% to 20% filled with silt.

Rating 6: Fair Condition

1. Large trees or drift in channel requiring cutting or removal.
2. Moderate channel scour. Refer to "Channel and Substructure Ratings as a Result of Scour" detail in Chapter 6 or "Culvert/Channel Rating" in Chapter 7.
3. Two feet of scour at RCB toewalls.
4. Channel out of alignment within right of way.
5. Bank protection devices require repair.
6. Cross sectional area of barrel opening 20% to 40% filled with silt.

Rating 5: Generally Fair Condition

1. Channel out of alignment, requiring readjustment beyond right of way.
2. Major channel scour exposing footings. Refer to "Channel and Substructure Ratings as a Result of Scour" detail in Chapter 6 or "Culvert/Channel Rating" in Chapter 7.

3. Bank protection devices require replacement.

4. Three feet of scour at RCB toewalls.

5. Cross sectional area of barrel opening more than 40% filled with silt.

Rating 4: Poor Condition

1. Substructure scour exposing piling or portion of bottom footing. Refer to "Channel and Substructure Ratings as a Result of Scour" detail in Chapter 6.

2. Major channel work needs to be performed to stabilize channel from degrading or eroding banks or to correct undermining. Refer to "Culvert/Channel Rating" in Chapter 7.

Rating 3: Serious Condition

1. Similar comments as "Rating 4", except in the opinion of the inspector, the integrity of the bridge could be threatened and, therefore, repair work should be performed immediately.

Rating 2: Critical Condition - It is strongly recommended that the facility should be closed until the indicated repair is completed or until a structural analysis is performed by a Professional Engineer licensed in Kansas. A Critical Inspection Finding is required to be filed with KDOT BLP.

1. Similar comments as "Rating 4", except in the opinion of the inspector, the integrity of the bridge is threatened and, therefore, the bridge should be closed until the necessary work is completed.

Rating 1: Bridge is CLOSED.

1. Bridge is closed but it appears feasible to be repaired or a study has been done which indicates that the bridge could be reopened after rehabilitation is complete.

Rating 0: Bridge is CLOSED.

1. Bridge is closed and beyond repair. Replacement is necessary.

Chapter

9

APPRAISAL

NBI Items 67, 68, and 69 within this Chapter are calculated automatically

CHAPTER CONTENTS

APPROACH ROADWAY ALIGNMENT (NBI ITEM 72)

Record 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 for 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 below 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 reasonable 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.

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.

Rating 9: Superior to present desirable criteria.

Rating 8: Equal to present desirable criteria.

Rating 7: Better than present minimum criteria.

Rating 6: Equal to present minimum criteria.

Rating 5: Somewhat better than minimum adequacy to tolerate being left in place as is.

Rating 4: Meets minimum tolerable limits to be left in place as is.

Rating 3: Basically intolerable requiring high priority of corrective action.

Rating 2: Basically intolerable requiring high priority of replacement.

Rating 1: This value of rating code not used.

Rating 0: Bridge closed.

WATERWAY ADEQUACY (NBI ITEM 71)

This item appraises the waterway opening of the bridge with respect to the passage of the flow through the bridge. The waterway adequacy shall be evaluated using the following criteria based on the best available information for each individual bridge site. **The waterway adequacy appraisal rating is used as a history of the performance of the stream at the site; therefore, its rating will not improve unless significant channel work has been performed.**

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.

Rating N:	Not Applicable.	Use when bridge is not over a waterway (channel).
Rating 9:	Not used.	Not used.
Rating 8:	OK.	Bridge deck above roadway approaches. Remote chance of overtopping roadway approaches.
Rating 7:	Drift.	Slight chance of overtopping bridge deck and roadway approaches or drift present.
Rating 6:	Scour or Erosion.	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays or scour and/or erosion present.
Rating 5:	High water on Superstructure	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with significant traffic delays with evidence of high water such as drift in superstructure.
Rating 4:	Occasional high water over bridge	Occasional overtopping of bridge deck and roadway approaches with significant traffic delays. Evidence of channel silt on deck and/or drift/debris in or on guardrails.
Rating 3:	Frequent high water	Frequent overtopping of bridge deck over bridge and and roadway approaches with significant traffic delays.
Rating 2:	Frequent overtopping	Frequent overtopping of bridge deck and roadway of bridge and roadway approaches with severe traffic delays.
Rating 1:	Bridge is CLOSED.	Bridge is closed but it appears feasible to be repaired or a study has been done which indicates that the bridge could be reopened after rehabilitation is complete.
Rating 0:	Bridge is CLOSED.	Bridge is closed and beyond repair. Replacement is necessary.

SCOUR CRITICAL (NBI ITEM 113)

See Chapter 10 - Scour.

STRUCTURAL EVALUATION (NBI ITEM 67) (Automatically calculated)

The appraisal rating is to be based on the condition rating of NBI Items 59 (Superstructure), 60 (Substructure), and 66 (Inventory Rating). This item generally should be coded no higher than the lowest condition rating of the superstructure or the substructure. The code will also be based on the value obtained from Table 1 which evaluates the inventory rating (HS equivalent) shown for various traffic volumes.

For other than culverts, the lowest of the codes obtained from NBI Item 59 (Superstructure), NBI Item 60 (Substructure), or Table 1 should generally be used.

For culverts, the lowest of the codes obtained from NBI Item 62 (Culverts), or Table 1 should generally be used.

Table 1 (NBI Item 67)
Rating by Comparison of ADT – NBI Item 29 and Inventory Rating - Item 66

Structural Evaluation Rating Code	Inventory Rating / Average Daily Traffic (ADT)		
	0-500	501-5000	>5000
9	>236* (HS20)**	>236 (HS20)	>236 (HS20)
8	236 (HS20)	236 (HS20)	236 (HS20)
7	231 (HS17)	231 (HS17)	231 (HS17)
6	223 (HS13)	225 (HS14)	227 (HS15)
5	218 (HS10)	220 (HS11)	222 (HS12)
4	212 (HS7)	214 (HS8)	218 (HS10)
3	Inventory rating less than value in rating code or 4 and requiring corrective action.		
2	Inventory rating less than value in rating code or 4 and requiring replacement.		
0	Bridge Closed		

Notes:

1. Use the lower rating code for values between those list in the table.

2. The live load used in establishing the Inventory Rating shall be one of the standard AASHTO vehicles or the maximum legal loads of the State.

3. To use Table 1, the Inventory Rating must be the coded HS rating or its equivalent.

4. All bridges on the Interstate system shall be evaluated using the ADT column of >5000 regardless of the actual ADT on the bridge.

*** Coded HS rating load (typical)**
**** HS Designation (typical)**

DECK GEOMETRY (NBI ITEM 68) (Automatically calculated)

The overall rating for deck geometry will include two evaluations: (a) the curb-to-curb or face-to-face of rail bridge width using Table 2A, B, C, or D and (b) the minimum vertical clearance

over the bridge roadway using Table 2E. The lower of the codes obtained from these tables shall be used. When an individual table lists several deck geometry rating codes for the same roadway width under a specific ADT, use the lower code. (For example, Table 2A lists deck geometry rating codes of "6", "7" and "8" for a 44-foot roadway width and an ADT of >5000. Use the code of "6".) Use the lower code for values between those listed in the tables.

The curb-to-curb or face-to-face of rail dimension shall be taken from NBI Item 51 - Bridge Roadway Width, Curb-to-Curb. NBI Item 53 - Minimum Vertical Clearance Over Bridge Roadway shall be used to evaluate the vertical clearance.

The values provided in the tables are for rating purposes only. Current design standards must be used for structure design or rehabilitation.

Table 2A and 2B (NBI Item 68)
Rating by Comparison of ADT – NBI Item 29
and Bridge Roadway Width, Curb-to-Curb – NBI Item 51

Deck Geometry	Table 2A					Table 2B		
	Bridge Rdwy. Width 2 Lanes; 2-Way Traffic					Bridge Rdwy. Width 1 Lane; 2-Way Traffic		
	ADT (Both Directions)					ADT (Both Directions)		
Rating Code	0-100	101-400	401-1000	1001-2000	2001-5000	>5000	0-100	>100
9	>32	>36	>40	>44	>44	>44	-	-
8	32	36	40	44	44	44	15'-11"	-
7	28	32	36	40	44	44	15	-
6	24	28	30	34	40	44	14	-
5	20	24	26	28	34	38	13	-
4	18	20	22	24	28 (28*)	32	12	-
3	16	18	20	22	26 (26*)	30	11	-
2	Any width less than required for a rating code of 3 and structure is open.							
0	Bridge Closed							

*** Use value in parentheses for bridges longer than 200 feet.**

Notes:

1. Use the lower rating code for values between those listed in the table.
2. Dimensions are in feet.
3. For 3 or more undivided lanes of 2-way traffic, use Table 2C, Other Multilane Divided Facilities.
4. Do not use Table 2B for code 9 and for codes 8 through 4 inclusive when the ADT >100. Single lane bridges less than 16 feet wide carrying 2-way traffic are always appraised at 3 or below if they carry more than an ADT of 100.

Table 2C and 2D (NBI Item 68)
Rating by Comparison of Number of Lanes – NBI Item 28
and Bridge Roadway Width, Curb-to-Curb – NBI Item 51

Deck Geometry	Table 2C				Table 2D	
	Bridge Roadway Width 2 or More Lanes Each Direction				Bridge Roadway Width 1 Way Traffic	
	Interstate and Other Divided Freeways		Other Multilane Divided Highways		Ramps Only	
Rating Code	2 Lanes	3 or more Lanes	2 Lanes	3 or more Lanes	1 Lane	2 or more Lanes
9	>42	>12N+24	>42	>12N+18	>26	>12N+12
8	42	12N+24	42	12N+18	26	12N+12
7	40	12N+20	38	12N+15	24	12N+10
6	38	12N+16	36	12N+12	22	12N+8
5	36	12N+14	33	11N+10	20	12N+6
4	34(29)*	11N+12 (11N+7)*	30	11N+6	18	12N+4
3	33(28)*	11N+11 (11N+6)*	27	11N+5	16	12N+2
2	Any width less than required for a rating code of 3 and structure is open.					
0	Bridge Closed					

*** Use value in parentheses for bridges longer than 200 feet.**
N = number of lanes of traffic.

Notes:
1. Use the lower rating code for values between those listed in the tables.
2. Dimensions are in feet.
3. Use Table 2C, Other Multilane Divided Facilities, for 3 or more undivided lanes of 2-way traffic.

Table 2E (NBI Item 68)
Rating by Comparison of Minimum Vertical Clearance over Bridge Roadway- NBI Item 53 and Functional Classification – NBI Item 26

Deck Geometry Rating Code	Table 2E Minimum Vertical Clearance Functional Class			
	Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals
	All Routes Except as noted for Urban Areas	Undesignated Routes, Urban Areas *		
9	>17'-0"	>16'-6"	>16'-6"	>16'-6"
8	17'-0"	16'-6"	16'-6"	16'-6"
7	16'-9"	15'-6"	15'-6"	15'-6"
6	16'-6"	14'-6"	14'-6"	14'-6"
5	15'-9"	14'-3"	14'-3"	14'-3"
4	15'-0"	14'-0"	14'-0"	14'-0"
3	Vertical clearance less than value in rating code of 4 and requiring corrective action.			
2	Vertical clearance less than value in rating code of 4 and requiring replacement.			
0	Bridge Closed			

*** Use for routes in highly developed urban areas only when there is an alternative interstate, freeway, or expressway facility with a minimum of 16'-0" clearance.**

Notes:
1. Use the lower rating code for values between those listed in the table.

UNDERCLEARANCES, VERTICAL AND HORIZONTAL (NBI ITEM 69)

(Automatically calculated)

This item is calculated by the Edit/Update Program and is not coded by the bridge inspector.

Vertical and horizontal underclearances are measured from the through roadway to the superstructure or substructure units, respectively. Code "N" is used unless the bridge is over a highway or railroad.

The vertical underclearance is evaluated using Table 3A. The horizontal underclearance is evaluated using Table 3B. The lower of the codes obtained from Table 3A and Table 3B is used by the Edit/Update Program.

Bridges seldom are closed due to deficient underclearances; however, these bridges may be good candidates for rehabilitation or replacement.

NBI Item 54 - Minimum Vertical Underclearance, NBI Item 55 - Minimum Lateral Underclearance on Right, and NBI Item 56 - Minimum Lateral Underclearance on Left are used to evaluate this item.

The functional classification used in the table is for the under passing route. Therefore, the functional classification is obtained from the record for the route "under" the bridge (see NBI Item 5 - Inventory Route).

If the under passing route is not on a Federal-aid system, is not a defense route, or is not otherwise important, an "under" record may not be available. If no "under" record exits, it is assumed that the route under the bridge is a major or minor collector or a local road for the purpose of using Tables 3A and 3B.

Table 3A (NBI Item 69)
Rating by Comparison of Minimum Vertical Underclearance – NBI Item 54 and Functional Classification of Underpassing Route

Underclearance Rating Code	Table 3A Minimum Vertical Clearance				
	Functional Class				
	Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroad
	All Routes Except as noted for Urban Areas	Undesignated Routes, Urban Areas *			
9	>17'-0"	>16'-6"	>16'-6"	>16'-6"	>23'-0"
8	17'-0"	16'-6"	16'-6"	16'-6"	23'-0"
7	16'-9"	15'-6"	15'-6"	15'-6"	22'-6"
6	16'-6"	14'-6"	14'-6"	14'-6"	22'-0"
5	15'-9"	14'-3"	14'-3"	14'-3"	21'-0"
4	15'-0"	14'-0"	14'-0"	14'-0"	20'-0"
3	Vertical clearance less than value in rating code of 4 and requiring corrective action.				
2	Vertical clearance less than value in rating code of 4 and requiring replacement.				
0	Bridge Closed				

*** Use for routes in highly developed urban areas only when there is an alternative Interstate, freeway or expressway facility with a minimum of 16'-0" clearance.**

Notes:

1. Use the lower rating code for values between those listed in the tables.

2. The functional classification of the underpassing route shall be used in the evaluation. If an "under" record is not coded, the underpassing route shall be considered a major or minor collector or a local road.

Table 3B (NBI Item 69)
Rating by Comparison of Minimum Lateral Underclearances Right and Left – NBI Items 55 & 56 and Functional Classification of Underpassing Route

Underclearance Rating Code	Table 3B Minimum Lateral Clearance Functional Class						
	1-Way Traffic				2-Way Traffic		
	Principal Arterials-Interstate, Freeways, or Expressways				Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroad
	Mainline		Ramp				
	Left	Right	Left	Right			
9	>30	>30	>4	>10	>30	>12	>20
8	30	30	4	10	30	12	20
7	18	21	3	9	21	11	17
6	6	12	2	8	12	10	14
5	5	11	2	6	10	8	11
4	4	10	2	4	8	6	8
3	Vertical clearance less than value in rating code of 4 and requiring corrective action.						
2	Vertical clearance less than value in rating code of 4 and requiring replacement.						
0	Bridge Closed						

Notes:

1. Use the lower rating code for values between those listed in the tables.

2. Dimensions are in feet.

3. When acceleration or deceleration lanes or ramps are provided under 2-way traffic, use the value from the right ramp column to determine code.

4. Functional classification of the underpassing route shall be used in the evaluation. If an "under" record is not coded, the underpassing route shall be considered a major or minor collector or a local road.

SUFFICIENCY RATING (Automatically calculated)

The sufficiency rating is a historic measure used to generally describe the functionality of a bridge based on a scale from 0 to 100.

TRAFFIC SAFETY FEATURES (NBI ITEM 36)

This field is to evaluate traffic safety features at the bridge site.

a) Bridge Railings: Some factors that affect the proper functioning of bridge railing are height, material, strength, and geometric features. Railings should be capable of redirecting certain impacting vehicles. Bridge railings should be evaluated using the AASHTO "Standard Specifications for Highway Bridges" as a guide for establishing a currently acceptable standard.

b) Transitions: The transition from approach rail to bridge railing requires that the approach rail be firmly attached to the bridge railing. It also requires that the approach railing be gradually stiffened as it comes closer to the bridge railing. Currently the only standard guardrail transitions used are the thrie beam and rubrail attachments. A concrete transition to non-mountable curb with traffic speeds at or below 45 mph is also acceptable. Other transitions do not meet current standards and therefore "0" is coded in the second box of traffic safety features.

c) Approach Guardrail Length: The structural adequacy and compatibility of approach guardrail with transition designs should be determined. Rarely does the need for a barrier stop at the end of a bridge. Thus, an approach guardrail with adequate length and structural qualities to reasonably shield motorists from the bridge needs to be installed. Lengths considered standard vary for different structures because each length is a function of ADT, design speed, side slope, flare rate, and distance from edge of pavement to installation line. Acceptable guardrail design suggestions are contained in the AASHTO Guide for Selecting, Locating, and Designing Traffic Barriers.

d). Approach Rail Ends: As with guardrail ends in general, the ends of approach rails to bridges should be flared, buried, made breakaway, or shielded. Design treatment of guardrail ends is given in the AASHTO Guide for Selecting, Locating, and Designing Traffic Barriers.

The data collected shall apply only to the route on the bridge. Collision damage or deterioration of the elements are not considered when coding this item. This item is composed of four segments.

Segment	Description
36A	Bridge railings
36B	Transitions
36C	Approach guardrail
36D	Approach guardrail ends

The reporting of these features shall be as follows:

DESCRIPTION	
0	Inspected feature does not meet currently acceptable standards. Code "0" for a condition where guardrail is currently required by standards and none is provided.
1	Inspected feature meets currently acceptable standards.
N	Not applicable or a safety feature is not required.

EXAMPLE	INTERPRETATION
1011	All features meet currently acceptable standards except transitions.
1111	Concrete rail transition from bridge rail to non-mountable curb with low traffic speeds.

Chapter

10

SCOUR

INTRODUCTION

The need to minimize future flood damage to the Nation's bridges requires additional attention be devoted to developing and implementing improved procedures for designing, protecting and inspecting bridges for scour (See NBIS, 23 CFR 650 Subpart C.). Current information on this subject has been assembled in the FHWA design publication Hydraulic Engineering Circular (HEC) 18, "Evaluating Scour at Bridges," FHWA-IP-90-017. Recommendations for developing and implementing a scour evaluation program have been given to BLP by the FHWA. These recommendations have been developed based on the review and evaluation of the existing policies and guidance pertaining to bridge scour.

PURPOSE

Every bridge over a waterway, whether existing or under design, should be evaluated for its vulnerability to scour in order to determine the prudent measures to be taken for its protection. Most waterways can be expected to experience scour over a bridge's service life (which could approach 100 years). Exceptions might include waterways in massive, competent rock formations where scour and erosion occur on a scale measured in centuries. The added cost of making a bridge less vulnerable to scour is small when compared to the total cost of a failure. Moreover, the need to provide for public safety and to attempt to minimize the adverse effects stemming from bridge closures requires that best efforts are used to improve the state-of-practice of designing and maintaining bridge foundations to resist the effects of scour. The recommendations listed below summarize the essential elements which should be addressed in developing a program for evaluating bridges and providing countermeasures for scour. Detailed guidance regarding approaches for implementing the recommendations are included in HEC 18.

If this chapter conflicts with any of the requirements of the Code of Federal Regulations (CFR), then the current versions of the NBIS, AASHTO "Manual for Bridge Evaluations", "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges", or "Bridge Inspector's Reference Manual" (BIRM) shall govern.

SCOUR CRITICAL INSPECTION DEFINITIONS

Scour: The result of the erosive action of flowing water. Flowing water might remove sediment from the streambed and banks as well as from around the piers and abutments of bridges.

Scour Critical: A bridge with a foundation element having been determined to be unstable for the observed or evaluated scour condition 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").

HEC-18 Scour Analysis: FHWA HEC-18 is a detailed methodology to determine potential scour depths at bridge foundations. Scour analyses shall be made by hydraulic/geotechnical/structural engineers.

Rapid Assessment for Scour Procedure (RASP): An efficient and cost-effective method to assess bridges and estimates the primary components of scour outlined in HEC-18. These estimates are based on the assumed conditions likely to occur during a flood event. These assumed conditions are obtained from existing inspection data, aerial imagery, and bridge construction plans.

The primary goal of this procedure is to identify scour susceptible bridges and recommend countermeasures. This procedure has served as the means of determining a recommended NBI Item 113 Code based on definitions located in the NBI Item 113 Code definitions of this section.

Plan of Action (POA): The NBIS regulation, 23 CFR 650.313, requires, among other factors, bridge owners identify scour critical bridges (coded "0", "1", "2", or "3" in NBI Item 113 as defined below) and prepare a POA to monitor known and potential deficiencies. The purpose of a POA is to create guidance and describe procedures to implement at structures deemed scour critical before, during, and after a flood event to protect the traveling public. In addition to scour critical bridges, a POA should be generated to identify and protect bridges having unknown foundations (Coded "U" in NBI Item 113). This document consists of several items, including the scour assessment itself, determinants as to why the bridge is scour critical, the suggested steps for mitigating the effects of scour, suggested interval for follow up inspections should they differ from a biennial cycle, and a space for inspectors to fill in during successive inspections to report status of the original scour findings. A POA template is available for download on the KART website. For further information on Scour POAs, see section starting on page 10.6.

NBI Item 113 Codes: The Item 113 Code of the NBIS is used to identify the current status of a bridge regarding its vulnerability to scour. KDOT uses numerical codes ranging from 0-9 to describe scour vulnerability of bridges throughout the State of Kansas. Alphabetical codes of "U" and "N" are also used to denote bridges with unknown foundations and those not over a waterway respectively.

A single-digit code as indicated below should be used to identify the current status of the bridge regarding its vulnerability to scour. As previously stated, evaluations shall be made by hydraulic/geotechnical /structural engineer. Guidance on conducting a scour evaluation is included in the FHWA Technical Advisory T 5140.23 titled, "Evaluating Scour at Bridges." Detailed engineering guidance is provided in the HEC 18 titled "Evaluating Scour at Bridges." Whenever a rating factor of "2" or below is determined for this item, the rating factor for NBI Item 60 - Substructure and other affected items (i.e., load ratings, superstructure ratings) should be revised to be consistent with the severity of observed scour and resultant damage to the bridge and a Critical Inspection Finding needs to be filed (see Chapter 1). A plan of action should be developed for each scour critical bridge (see FHWA Technical Advisory T 5140.23, HEC 18 and HEC 23). It is assumed the coding of this item has been based on an engineering evaluation, which includes consultation of the NBIS field inspection findings. NBI Item 113 codes are defined as follows:

Rating N: Bridge ***not*** over waterway.

Rating U: Bridge with "***unknown***" foundation that has not been evaluated for scour. Until risk can be determined, a POA 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).

Rating 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").

Rating 9: Bridge foundations (including piles) on dry land and well above flood water elevations.

Rating 8: Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above top of footing or drilled shaft (Example A, Page 10.4) 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 calculation or by installation of properly designed countermeasures (see HEC 23).

Rating 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.

Rating 6: Scour calculation/evaluation has not been made. (**Used by KDOT to describe when the Item 113 Justification Form has not yet been received**.)

Rating 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).

Rating 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).

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

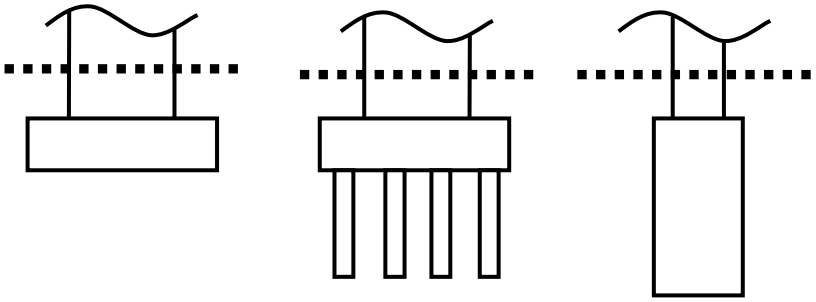
Rating 2: Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by:
-a comparison of calculated scour and observed scour during the bridge inspection, or
-an engineering evaluation of the observed scour condition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

Rating 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 NBI Item 60.

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

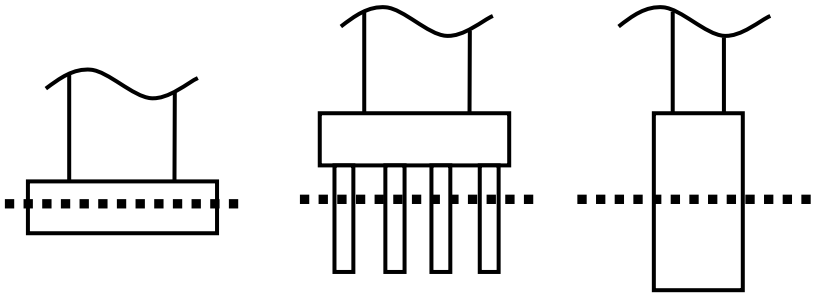
SCOUR CRITICAL EXAMPLES

A. Above top of footing or drilled shaft



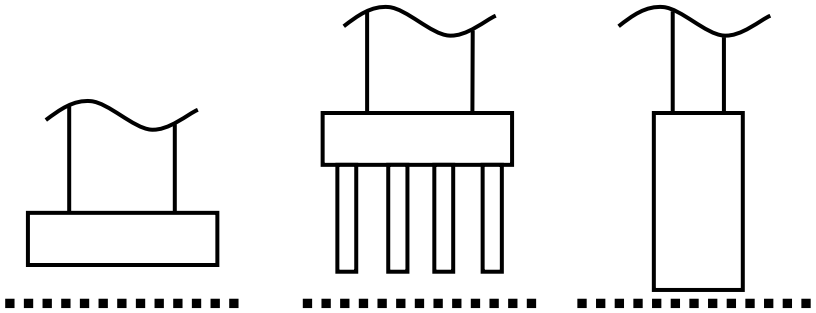
None – indicate ratings of 8 for this item

B. Within limits of footing, piles, or drilled shaft



Conduct foundation structural analysis

C. Below footing, pile tips, or drilled shaft



Provide for monitoring and scour countermeasures as necessary

Spread Footing (Not Founded in Rock) Pile Footing Drilled Shaft

= Calculated scour depth

EVALUATING SCOUR DURING BRIDGE INSPECTIONS (Routine, Underwater, Special)

During bridge inspections, the inspector should evaluate the present condition of the bridge foundation for scour and the overall scour potential at the bridge. In order to evaluate the relationship between the bridge and the waterway it is crossing, general site condition considerations should be made of the waterway up- and downstream of the bridge including the following observations:

- Is there evidence of general degradation or aggradation of the waterway channel resulting in unstable bed and banks?

• Is there evidence of on-going development in the watershed and particularly in the adjacent floodplain that could be contributing to channel instability?
• Are there active gravel or sand mining operations in the channel near the bridge?
• Are there confluences with other waterways? How will the confluence affect flood flow and sediment transport conditions?
• Is there evidence at the bridge or in the up- and downstream reaches the waterway carries large amounts of debris? Is the bridge superstructure and substructure streamlined to pass debris, or is it likely debris will hang up on the bridge and create adverse flow patterns with resulting scour?
• The best way of evaluating flow conditions through the bridge is to look at and photograph the bridge from the up- and downstream channel. Is there a significant angle of attack of the flow on a pier or abutment?

ASSESSING THE SCOUR POTENTIAL DURING BRIDGE INSPECTIONS (Routine, Underwater, Special)

The items listed below are provided for consideration by bridge inspectors in assessing the adequacy of the bridge to resist scour. In making this assessment, inspectors need to understand and recognize the interrelationships between NBI Item 60 (Substructure), NBI Item 61 (Channel and Channel Protection), NBI Item 71 (Waterway Adequacy), and NBI Item 113 (Scour Critical Bridges). Additional follow-up by an interdisciplinary team should be made utilizing NBI Item 113 (Scour Critical Bridges) when the bridge inspection reveals a potential problem with scour.

Items to monitor

- Unstable Banks
  - Bank sloughing, steep banks, cracking or undermining of the banks etc.
- Stable Banks
  - Vegetation and trees along the banks, riprap or channel stabilization measures in place.
- Channel
  - Clear and open with good approach flow conditions versus meandering or braided channel with main channel at an angle to the orientation of the bridge.
  - Existence of islands, bars, debris, cattle guards, fences affecting flow.
  - Aggrading or degrading streambed.
  - Evidence of movement of channel with respect to bridge (make sketches, take pictures).
  - Evidence of ponding of channel flow.
- Floodplain
  - Does flow overtop road and/or return to the main channel?
    - Evidence of overtopping approach roads (debris, erosion of embankment slopes, damage to riprap or pavement, etc.).
  - Existence and hydraulic adequacy of relief bridges (if relief bridges are obstructed, they will affect flow patterns at the main channel bridge).
- Debris
  - Extent of debris in upstream channel.

- Other Features
    - Existence of upstream tributaries, bridges, dams, or other features affecting flow conditions at the bridges.

SCOUR PLAN OF ACTION (POA)

The following sections are intended to assist those who are responsible for POA development, implementation, updating, and retirement.

A POA is to create guidance as well as describe potential corrective measures and procedures to implement before, during, and after a flood event at a particular structure in order to protect the traveling public. In addition to scour critical bridges, a POA should be generated to identify and protect bridges having unknown foundations. See the section titled Plan of Action Categories for a detailed list and description of items that may warrant a POA to be generated for a bridge.

The information outlined below is intended to fulfill a NBIS requirement. KDOT-BLP is not obligated to perform any of the work required of a local agency as part of this requirement. Local agencies own the bridges and as stated in Kansas Statute 19-101 the local agencies are generally responsible for ensuring the requirements are fulfilled. Some local agencies may be able to complete the tasks on their own depending on the professional engineering expertise available. Others may choose to hire a consultant who will act as the Professional Engineer (PE) representing the bridge owner to assist them with tasks. For directions to generate a POA, see Plan of Action Development in this chapter.

Documentation

During the Kansas Local Bridge Evaluation Program (KLBEP) (2010-2014), all NBI structures over water received a scour evaluation and an NBI Item 113 code was recommended based on the results of the scour evaluation. It is the responsibility of the owner to have any bridge built after 2014 evaluated for scour vulnerability. It is understood conditions can change over time, maintenance or remediation work can be performed, or other issues could arise requiring NBI Item 113 to be adjusted. In the event an inspector recommends changing an NBI Item 113 code, specific supporting documentation outlined in the NBI Item 113 Documentation Matrix in this chapter must be submitted to KDOT-BLP.

Bridges requiring a POA must have back-up documentation generated and uploaded to the BIP and submitted to KDOT-BLP upon completion of the bridge inspection cycle by the required and listed parties. The data requirements are outlined in the following sections as well as the NBI Item 113 Documentation Matrix in this chapter and should be reviewed carefully.

Scour Plan of Action Categories

There are three primary categories that could warrant a POA to be generated for a bridge. However, some bridges may require a POA for more than one category. Therefore, the POA template is designed to allow all categories to be captured and addressed within one document. The categories are:

1) Unknown Foundations

Many off-system bridges were either built without detailed construction plans that provide the specific foundation information or the construction plans are missing. Without further field investigation or testing, these bridges therefore have unknown foundations and cannot be assessed for scour vulnerability. The FHWA, according to a memo dated January 9, 2008, requires bridges which cannot be assessed for scour vulnerability due to unknown foundations shall receive a POA. The POA for a bridge with unknown foundations may be different than one for a bridge determined to be scour critical. The developed POA should clearly state the foundations are unknown and reflect any previous scour or erosion issues documented in previous inspection reports. The POA for a bridge having unknown foundations should contain recommended countermeasures and minimum requirements commensurate with the consequences of loss of service of the structure.

2) Scour Critical

Bridges assigned an NBI Item 113 code of "3", "2", "1", or "U" are deemed scour critical. Scour critical bridges are issued a POA to provide information necessary to efficiently address existing or potential scour issues and outline procedures to follow during a flood event. The POA details general information about the bridge which should include inspection cross-section plots, scour depths, and bridge structural elements plotted on a common vertical datum. Additionally, the POA should include inspection and monitoring requirements for the bridge, any necessary bridge-specific data to support the inspection and monitoring program, and a list of prioritized conceptual countermeasure designs along with a basis for choosing one countermeasure over the others.

Any bridge deemed as scour critical must have a bridge closure plan. For instance, when overtopping of the bridge deck is occurring, immediate closure action should occur. **Even if the overtopping is small (e.g., several inches), or only in a localized area, it may be recommended to immediately close the bridge per the POA.**

3) Debris

Many bridges experience debris accumulation. The accumulation of debris at a bridge can increase the potential for scour at piers and abutments. The debris accumulation essentially acts as a dam and diverts flow away from the desired location which can result in abutment fill slope failure and increased scour depths at piers. The problem of abutment fill slope failure is further magnified when the abutment has not been protected from the potential for scour. Bridges with a history of heavy debris accumulation may be issued a POA for debris monitoring even if the bridge is not classified as being scour critical. A POA for debris monitoring must identify the monitoring frequency, as well as criteria for action and items to watch.

Scour Plan of Action Development

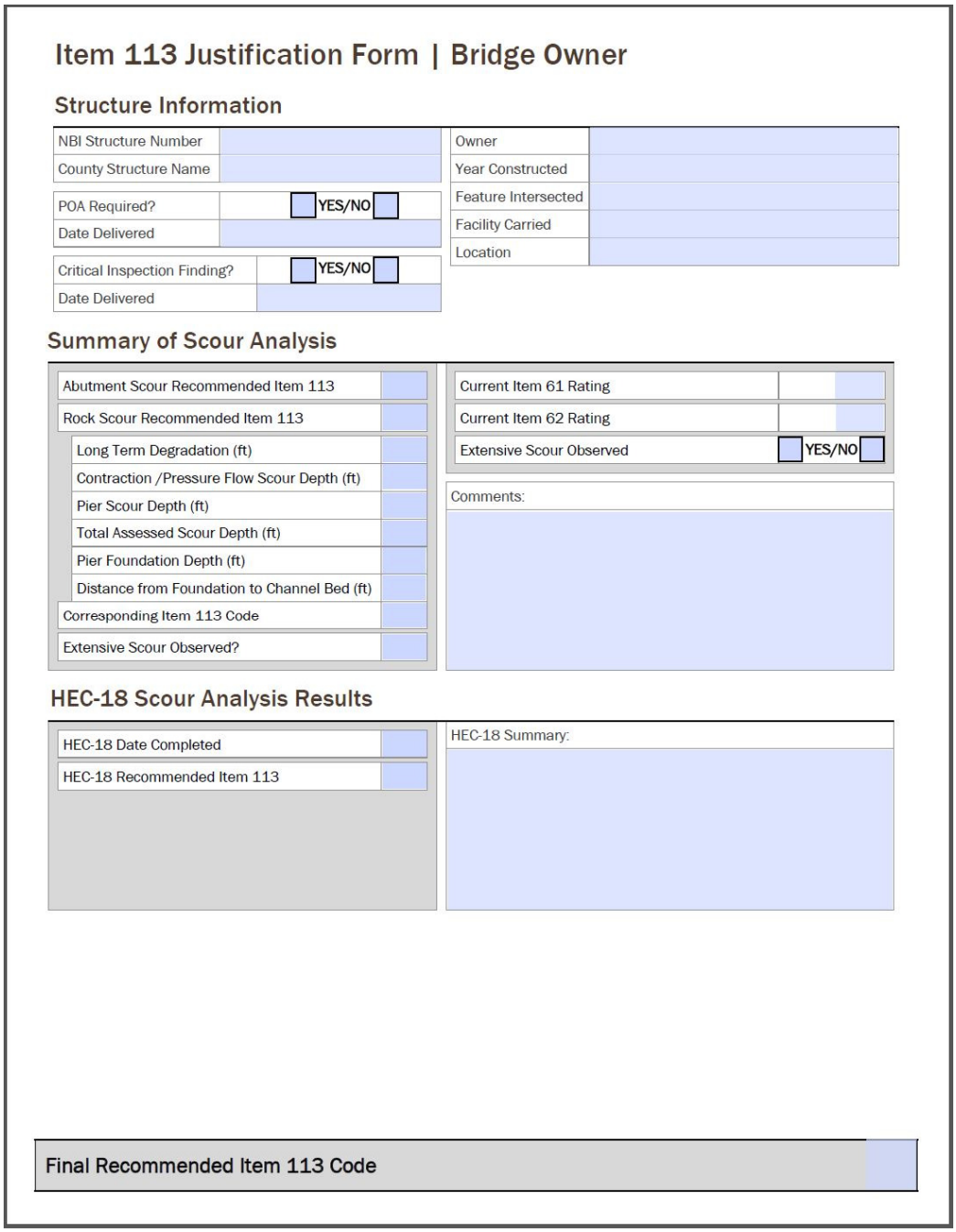
A POA must be developed for any bridge deemed scour critical through assessment or calculation per NBIS requirements. As stated in the introduction, one goal of the KLBEP was to provide each bridge over a waterway a scour evaluation and an appropriate NBI Item 113 code. The Item 113 Justification Form (see example on page 10.9) shall be included in each bridge record. The NBI codes recommended as part of the KLBEP utilized a comprehensive screening procedure and as

much data as was readily available at the time. **The key for inspectors evaluating these bridges going forward is to document and identify changes in the scour condition.** When circumstances arise that, in the opinion of the inspector, may warrant a POA to be developed (NBI Item 113 is "3", "2", "1" or "U") a Professional Engineer (PE) licensed in the State of Kansas shall be consulted. The PE is responsible for understanding the complex interaction between hydraulic, geotechnical, and structural components of the situation and developing an appropriate POA.

The following sections are intended to provide guidance to a PE representing the bridge owner in developing the POA. The POA form is intended to act as a means of addressing a variety of issues found at different bridges. As such, not every bridge will require every section of the POA form be completed and it is the responsibility of the PE representing the bridge owner to determine the content and details of the POA.

Plan of Action Sections

Initially during the office review of a bridge inspection, the inspector should review the bridge record for a Summary of Bridge/Culvert Scour Screening Results sheet (see example below). This initial document will provide important information for the bridge inspector to determine what information and considerations went into the NBI Item 113 coding.



Item 113 Justification Form | Bridge Owner

Structure Information

NBI Structure Number		Owner	
County Structure Name		Year Constructed	
POA Required?	YES/NO	Feature Intersected	
Date Delivered		Facility Carried	
Critical Inspection Finding?	YES/NO	Location	
Date Delivered			

Summary of Scour Analysis

Abutment Scour Recommended Item 113		Current Item 61 Rating	
Rock Scour Recommended Item 113		Current Item 62 Rating	
Long Term Degradation (ft)		Extensive Scour Observed	YES/NO
Contraction /Pressure Flow Scour Depth (ft)		Comments:	
Pier Scour Depth (ft)			
Total Assessed Scour Depth (ft)			
Pier Foundation Depth (ft)			
Distance from Foundation to Channel Bed (ft)			
Corresponding Item 113 Code			
Extensive Scour Observed?			

HEC-18 Scour Analysis Results

HEC-18 Date Completed	HEC-18 Summary:
HEC-18 Recommended Item 113	

Final Recommended Item 113 Code

When a POA is in place (NBI Item 113 coded "3", "2", "1", or "U" indicates a POA shall be in place), the inspector must review and update the specified data within the document to reflect changes in the site conditions and verify the POA is still valid. The inspector should review the POA to familiarize themselves with the current scour vulnerabilities associated with the structure and shown in the following sections.

Section 1-General Information

Section 1. General Information						Page 2 of 7
Structure Number	County Name	County Bridge Number	Location			
Example						
Feature Crossed	Facility Carried	Plans Available?	Culvert?	Phase I Score		
KDOT Code - Main Spans -Material	KDOT Code - Main Spans - Design					
Pier Foundation						
Abutment Foundation						
Channel Bottom Material						
Is bridge located in a critical path? If so, describe						

Section 1 of the POA covers general information about the bridge. This information is typically available from the Structure Inventory and Appraisal (SI&A) sheet or the bridge record retained by the bridge owner. The information regarding abutment and pier foundations should indicate how the structure is supported (spread footing, pile bents, drilled shaft, etc.). If the bridge is located on a critical route (a route which provides service to emergency facilities, is part of an evacuation route, etc.), the section describing the critical route should be populated by the individual creating the POA. This information is important in bridge closure plans.

Section 2-POA Responsibility

Section 2. POA Responsibility		
Author(s) of POA [Name, Title, Contact Information]		Date Updated
Concurrences on POA [Name, Title, Contact Information]		
POA Update Frequency	Date of Next Update	
POA Updated by		Date
Items Updated or is Plan Still Valid?		

Section 2 of the POA provides information regarding those responsible for preparing and maintaining the POA.

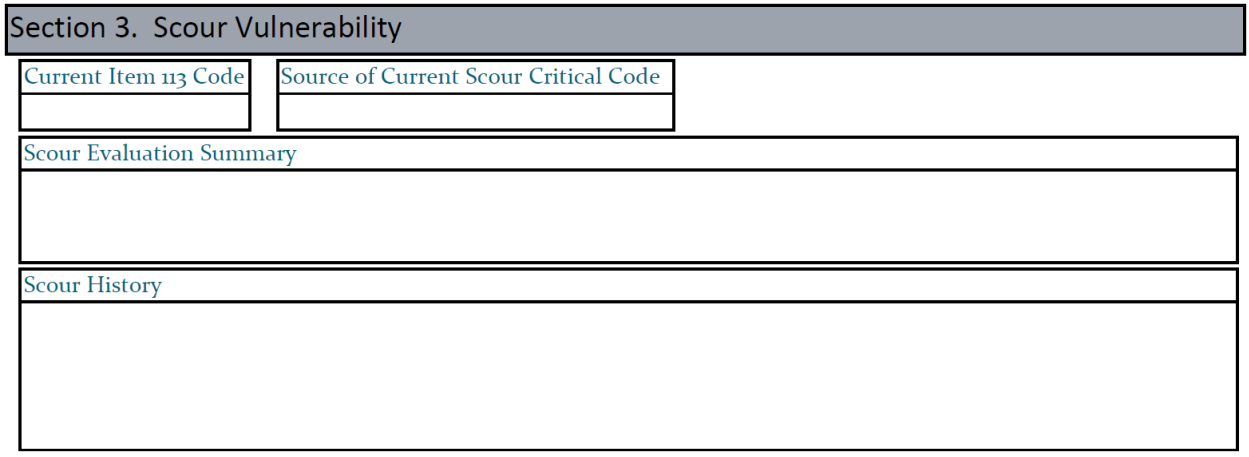
- Author(s) of POA refers to the individual or company that developed the POA.

- Concurrence on POA refers to the bridge owner who must understand and agree with the contents of the POA. The concurrences may also refer to upper management individuals who approve funding or county officials and law enforcement agencies who must agree with the bridge closure plans and the disruption the closure will have on the public. Gaining concurrence from the bridge owner prior to uploading and finalizing the POA is required. This shows that all agencies understand potential issues before an emergency occurs and helps to minimize conflicts during an emergency.

Also in Section 2 is information on the POA update, such as: the POA update frequency, who updated the POA, the date the update occurred, and what was updated. The POA should be reviewed and updated on a regular basis to ensure the contents are still valid, i.e. each routine bridge inspection. Furthermore, the POA should be reviewed after any major flood events to ensure the plan functioned as intended. If the POA did not function as intended, changes should be made to ensure it will function better during an emergency.

If conditions at the bridge remain unchanged, a POA Update Log is located after Section 10 of the POA. This area is solely intended to act as a means for an individual to note the POA has been reviewed and there is no change in conditions. By filling out the POA Update Log, the inspector acknowledges the POA is still valid and no revisions are necessary so a new POA document is not required. In the event an inspector determines countermeasures have been properly designed and installed to mitigate scour conditions described within the POA, Section 2 should be filled out. Steps to follow regarding how to properly update and retire a POA are located in the section titled "Plan of Action Update and Retirement" starting on page 10.20.

Section 3-Scour Vulnerability



Section 3 of the POA provides a summary of the scour status of the bridge. It should include the current NBI Item 113 code and the method used to determine the code. Also in Section 3, the individual issuing the POA should summarize key information from the scour evaluation such as scour depth and if there is overtopping or pressure flow. The scour history should be summarized and include when, where, and how much scour or stream instability has been observed at the bridge, as well as any scour countermeasures previously installed at the bridge and their performance.

Section 4-Recommended Action(s)

Section 4. Recommended Action(s)					Page 3 of 7
	Recommended		Implemented		
a. Increased Inspection Frequency	☐ Yes	☐ No	☐ Yes	☐ No	
b. Fixed Monitoring Device(s)	☐ Yes	☐ No	☐ Yes	☐ No	
c. Flood Monitoring Program	☐ Yes	☐ No	☐ Yes	☐ No	
d. Hydraulic/Structural Countermeasures	☐ Yes	☐ No	☐ Yes	☐ No	
e. Debris Removal/Monitoring	☐ Yes	☐ No	☐ Yes	☐ No	

Section 4 of the POA contains highlights from the recommended action items found in Sections 6 and 7. Items 4a, 4b, 4c, and 4e refer to the main parts of the POA monitoring program found in Section 6. Item 4d refers to the hydraulic or structural countermeasures selected in Section 7. This section cannot be completed until Sections 6 and 7 are completed.

Section 5-NBIS Coding Information

Section 5. NBIS Coding Information	
Current Item 60-Substructure	Previous Item 60-Substructure
Current Item 61-Channel & Channel Protection	Previous Item 61-Channel/Channel Protection
If Culvert, Item 62 Code	Previous Item 71-Waterway Adequacy
Current Item 71-Waterway Adequacy	Previous Item 113 Code
Current Item 113 Code	
Coding Comments	

Section 5 of the POA contains previous and current hydraulics-related NBI codes for the bridge. This information provides a quick indication of observed or potential long-term problems or adverse trends affecting the stability of the bridge foundations.

If completing the POA by using a database, the previous NBI codes may automatically populate from the database, whereas the current codes will always require entry from the POA issuer. The field for coding comments allows for capturing any comments on the observations or trends of the bridge.

Section 6-Monitoring Program

Section 6. Monitoring Program

☐ **Regular Inspection Program**

Items to Watch

☐ **Increased Inspection Frequency**

Recommended Frequency and Items to Watch

☐ **Underwater Inspection Required or Increased Frequency**

Recommended Frequency and Items to Watch

Section 6 of the POA highlights the details of monitoring and is divided into additional subsections. The monitoring program is a key component of the POA. The program should be designed to minimize or eliminate the risks of a bridge failure due to scour. A monitoring program may be necessary for scour critical bridges. Additionally, bridges with inferred foundations assessed to be not scour critical may have a POA establishing a monitoring program depending on the site-specific conditions. This monitoring POA could simply identify certain items to inspect, define the inspection frequency, recommend countermeasures, and in some cases initiate an underwater inspection program. Each subsection details an aspect of the monitoring program.

The first subsection of the Section 6 example above is the "*Regular Inspection Program*". Most bridges are on a biennial inspection frequency unless more frequent inspections are required. Bridge owners may choose to keep this schedule but may also instruct inspectors to look at certain items at the bridge to ensure stability with regards to scour. In this case, select the box for "Regular Inspection Program" and list the new items to be watched. These items may include countermeasures, channel bed elevations, signs of movement or settlement, and other relevant items.

The second subsection of the Section 6 example above is the "*Increased Inspection Frequency*". As previously mentioned, most bridges are on a biennial inspection frequency. Depending on the condition of the bridge, an increase in inspection frequency may be required. In this case, the "Increased Inspection Frequency" box is checked. Then the recommended time between inspections and specific items to watch as related to scour and stream stability are indicated.

The third subsection of the Section 6 example above is for "*Underwater Inspection Information*". Some bridges may require an underwater inspection for a variety of reasons including the nature of the channel. If a bridge requires an underwater inspection or currently receives underwater inspections but the frequency of inspection needs to be increased, the "Underwater Inspection Required" or "Increased Frequency" box is checked. Then, the time between inspections and items to watch are indicated on the POA.

☐ **Fixed Monitoring Device(s)**

Sample Interval ☐ 30 min ☐ 1 hr ☐ 6 hrs ☐ 12 hrs ☐ 24 hrs

Type of Instrument, Installation Location, and Frequency of Data Review

Scour Alert Criteria for each Pier/Abutment

Scour Critical Criteria for each Pier/Abutment

Criteria for Termination of Fixed Monitoring Program

The fourth subsection of Section 6 covers information on "*Fixed Monitoring Device(s)*". Fixed monitoring devices can provide continuous information about scour at a bridge and potentially lead to early identification of scour problems. If fixed monitoring devices are selected for use at a bridge, the "Fixed Monitoring Device" box is checked. The type of devices and locations must be described in the plan, and details about the devices may be included as Attachment E located in Section 10. A fixed monitoring device can send continuous information from the bridge site. This information can be massive and difficult to manage, so it may be less cumbersome to obtain the sample information periodically. The sampling interval should be indicated on the POA by checking the desired box for Sample Interval. In addition, scour alert criteria and scour critical criteria should be indicated on the plan. This criterion is generally a scour depth or channel bed elevation. Selecting a scour alert elevation higher than the scour critical elevation allows time to take action in protecting the traveling public and possibly the bridge. Finally, criteria for terminating the fixed monitoring program must be provided.

☐ **Flood Monitoring Program**

Flood Monitoring Required ☐ Yes ☐ No

Frequency of Flood Monitoring: ☐ 1 hr ☐ 3 hrs ☐ 6 hrs ☐ 12 hrs

Type: ☐ Visual Inspection

☐ Instrument (Check all that apply)

☐ Portable ☐ Geophysical ☐ Sonar ☐ Other

Flood Monitoring Event Defined by (check all that apply)

☐ Discharge ☐ Stage

☐ Rainfall Intensity ☐ Elevation Measured from

Post-Flood Monitoring Required ☐ Yes ☐ No

Frequency of Post-Flood Monitoring: ☐ Daily ☐ Weekly ☐ Monthly

The fifth subsection of Section 6 covers information on "*Flood Monitoring Program*" and describes monitoring actions that should be implemented during an actual flood event. When a flood occurs, the monitoring frequency should be indicated by checking the appropriate box. There are two types of flood monitoring, visual inspection and instrument. If a visual inspection is the only requirement, the "Visual Inspection" box is checked. Then, the individuals visually observing the bridge may look for movement or settlement of the bridge or for a certain water surface elevation

which could trigger the actions prescribed in the POA. In the case where some type of instrumentation is used to measure scour or water surface elevation, the "Instrument" box is checked and the applicable instrument type is indicated. Both "Visual Inspection" and "Instrumentation" boxes may be checked if necessary.

If flood monitoring is required, the POA should define thresholds of what constitutes a flood event by checking the applicable box. These thresholds may include:

- Discharge
- Stage
- Rainfall
- Intensity
- An elevation measured from a known point

The POA should clearly describe the thresholds and how the thresholds are determined. For example, the threshold for discharge or stage may be tied to a nearby USGS gage. Some bridges may have been marked with a threshold water surface elevation to ensure inspectors know when to implement the flood monitoring program.

Criteria for Termination of Flood Monitoring
Criteria for Termination of Post Flood Monitoring
Flood Monitoring Program Scour Alert Criteria
Flood Monitoring Program Scour Critical Criteria

In addition, scour alert criteria and scour critical criteria should be indicated on the plan. This criterion is generally a scour depth or channel bed elevation. Selecting a scour alert elevation higher than the scour critical elevation provides time to take action in protecting the traveling public and possibly the bridge.

In some cases, it will be necessary to continue to monitor the bridge after the defined flood event has passed. In such cases, check the "Post-Flood Monitoring Required" box indicating this and identify the desired monitoring frequency. Finally, criteria for terminating the flood and/or post-flood monitoring program must be provided.

☐ **Debris Monitoring Program**

Debris Monitoring Required ☐ Yes ☐ No

Frequency of Debris Monitoring ☐ Monthly ☐ Bi-Annually ☐ Other

Debris Monitoring Criteria and Items to Watch

Note: Additional Details for action(s) required may be included in Section 8.

Action(s) Required if Scour Alert Criteria Detected (include notification and closure procedures)

Action(s) Required if Scour Critical Criteria Detected (include notification and closure procedures)

Agency and Department Responsible for Monitoring

Montoring Contact Person [Name, Title, Contact Information]

The sixth and final subsection in Section 6 covers the "*Debris Monitoring Program*" information. As previously mentioned, heavy debris accumulation can exacerbate scour issues associated with pier and abutment foundations. In the case where debris monitoring is necessary, check the "Debris Monitoring Program" box, indicate the monitoring frequency, and define the monitoring criteria and items to watch.

The end of Section 6 contains important information regarding the monitoring programs defined in the subsections outlined above. The actions required when any of the scour alert or scour critical thresholds have been reached should be clearly described, as well as the information about the responsible personnel in charge of the monitoring program.

Section 7-Countermeasure Recommendations

Section 7. Countermeasure Recommendations
☐ Monitoring Countermeasure (See Section 6 and Section 10-Attachment E)
☐ Structural/Hydraulic Countermeasure (See Section 10-Attachment E)
Prioritize alternatives below.
Countermeasure #1
Countermeasure #2
Countermeasure #3
Basis for Selected Countermeasure
Agency and Department Responsible for Countermeasure Program
Countermeasure Contact person [Name, Title, Contact Information]
Countermeasure Impletemented by

Section 7 of the POA identifies the selected countermeasure for the bridge. There are three types of countermeasures which should be considered:

- Monitoring
- Hydraulic
- Structural

If a monitoring countermeasure is selected, then check the "Monitoring Countermeasure" box and refer to Section 6. Structural and hydraulic countermeasures can be designed to help protect a bridge from the potential for scour. These countermeasures may be permanent fixtures or temporary countermeasures installed to protect the bridge for a limited time period. The purpose of temporary countermeasures (for example, riprap) may be to mitigate scour issues on a bridge which has many years left in its life span or effectively protect a bridge scheduled for replacement in the near future but requires additional protection for the interim period.

Depending on the type of temporary countermeasure and its performance over time, the bridge may be reclassified as not scour critical and assigned an appropriate NBI Item 113 code but still should be inspected following large flood events. Permanent countermeasures would normally consist of underpinning, grade control structures, or channel modifications. After installation of a permanent countermeasure, the NBI Item 113 rating is changed in accordance with the type of countermeasure installed.

In the event a hydraulic or structural countermeasure is necessary, Section 7 summarizes and prioritizes the countermeasures considered for the bridge, as well as the basis for selection. The design of hydraulic or structural countermeasure should be done in accordance with FHWA Hydraulic Engineering Circular Number 23 (Lagasse, et al. 2009). Both boxes may be checked if needed. All supporting information, including design calculations, should be included as Attachment E located in Section 10.

The last part of Section 7 requires information on the parties responsible for implementing and maintaining the countermeasure program.

Section 8-Bridge Closure Plan

Section 8. Bridge Closure Plan Page 6 of 7

Scour Monitoring Criteria for Consideration of Bridge Closure:

- ☐ Discharge
- ☐ Water Surface Elevation Reaches
- ☐ Bridge is in Pressure Flow
- ☐ Heavy Debris Accumulation
- ☐ Overtopping of Roadway or Structure
- ☐ Movement of Riprap/Other Armor Protection
- ☐ Scour Measurement Results/Monitoring Device (See Section 6
- ☐ Loss of Embankment or Abutment Fill Slope
- ☐ Observed Structure Movement/Settlement

Agency and Department Responsible for Bridge Closure
Bridge Closure Contact Person [Name, Title, Contact Information]
Criteria for Re-Opening Bridge
Agency and Person Responsible for Re-Opening after Inspection

Section 8 of the POA provides instructions for closing a bridge. This section should include:

- When to close a bridge
- Who should close the bridge and their contact information
- Criteria for re-opening the bridge
- Who is responsible for re-opening

Several reasons for closing a bridge are listed in Section 8. Select the applicable conditions that could jeopardize the bridge. The decision to close the bridge is made by the bridge owner. The bridge owner is also responsible for erecting appropriate barricades at the bridge and for establishing and marking detour routes when necessary. The decision to post a law enforcement officer at the bridge is made on a case-by-case basis depending on the particular circumstances surrounding the bridge closure. This is not a common decision.

If bridge closure is necessary, the POA must also detail the criteria and process for re-opening the bridge. In many cases, the bridge may not be re-opened until the floodwater has receded sufficiently to perform a post-flood inspection to ensure it is structurally sound. The personnel who will inspect or re-open the bridge must be included in the plan. Establishing a process for re-opening the bridge with designated decision-makers will help eliminate confusion and disagreements between those who close the bridge and those who wish to re-open the bridge.

Section 9-Detour Route

Section 9. Detour Route
Detour route Description (include bridges on detour route, their Item 113 Code and place map in Attachment G)
Traffic Control Equipment and Locations
News Release, Other Public Notice (include authorized person(s), information to be provided and limitations)

Section 9 of the POA describes potential detour routes in the event of bridge closure. The description should include route names, bridges located on the route along with their NBI Item 113 codes, as well as any other information pertinent to clearly identifying a safe detour route. A map of the detour routes should be included as Attachment G in Section 10. In many cases, the best reference for establishing a detour route is the county highway department. In preparing a detour route, it is advisable to obtain concurrence with local law enforcement agencies on the proposed detour route and the closing procedure and to provide a copy of the POA to those agencies.

Also included in Section 9 is the description of the traffic control equipment required for the detour route and its locations. It is recommended traffic control equipment follow the Manual on Uniform Traffic Control Devices (MUTCD) standards.

Finally, information about how to notify the public about the bridge closure and detour route and who is authorized to do so must be included along with the limitations on what information is provided.

Section 10-Attachments

Section 10. Attachments Page 7 of 7

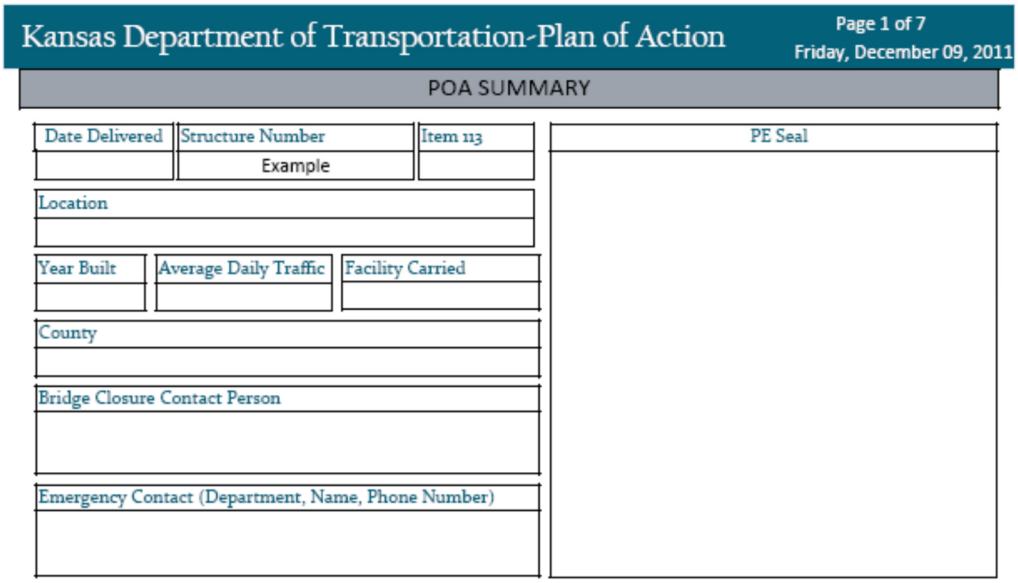
Indicate all documents and materials being submitted with this POA

- ☐ Attachment A-Boring Logs and/or Subsurface Information
- ☐ Attachment B-Cross Sections from Current and Previous Inspections
- ☐ Attachment C-Bridge Elevation Showing Existing Streambed, Foundation Depths, and Observed, Assessed, and/or Calculated Scour Depths
- ☐ Attachment D-Plan View Showing Location of Scour Holes, Debris, etc.
- ☐ Attachment E-Supporting Documentation, Calculations, and Conceptual Designs for Scour Countermeasures
- ☐ Attachment F-Representative Photographs
- ☐ Attachment G-Map Showing Detour Rout

Section 10 of the POA is the final section and contains a checklist of the supporting attachments. Not every POA will require all attachments but should include enough supporting documentation to justify the POA. The attachments are as follows:

- Attachment A – Boring Logs and/or Subsurface Information
- Attachment B – Cross Sections from Current and Previous Inspections
- Attachment C – Bridge Elevation Showing the Existing Streambed, Foundation Depths, and the Observed, Assessed, and/or Calculated Scour Depth
- Attachment D – Plan View Showing Location of Scour Holes or Debris
- Attachment E – Supporting Documentation, Calculations, and Conceptual Designs for Scour Countermeasures
- Attachment F – Representative Photographs of the Bridge
- Attachment G – Map Showing Detour Route

Finalizing the Plan of Action


Kansas Department of Transportation-Plan of Action
Page 1 of 7
Friday, December 09, 2011
POA SUMMARY
Date Delivered
Structure Number
Example
Item 113
PE Seal
Location
Year Built
Average Daily Traffic
Facility Carried
County
Bridge Closure Contact Person
Emergency Contact (Department, Name, Phone Number)

Upon completion of populating the relevant field within the POA the Professional Engineer representing the bridge owner must apply their Profession Engineer Seal in the space provided on the page 1 of the POA, the POA Summary sheet. All other fields shown on the POA Summary page are automatically populated from subsequent sections. Then the contents of the POA must be explained thoroughly to the bridge owner and placed in the associated bridge record. Additionally, a digital copy of the POA must be submitted to KDOT-BLP along with the supporting documentation and uploaded into the bridge record in the Bridge Inspection Portal.

PLAN OF ACTION UPDATE AND RETIREMENT

The following sections are intended to provide procedures to follow when updating or retiring a POA. In both cases, specific documentation is necessary to show the PE representing the bridge owner understands the specific change in conditions or appropriate actions have been taken to address the conditions at a bridge that warranted a POA.

Determining an effective solution to a stream bed or river problem is difficult. Settlement of foundations, local scour, bank erosion, and channel degradation are complex problems and cannot

always be solved with a single repair. Hydraulic, geotechnical, and structural engineering expertise are required to provide an effective solution because there are cases where certain remedial work may be detrimental to the structure.

POA Updates

POA Update Log	*Populate in lieu of Section 2 only if there are no changes in conditions and Plan of Action is still valid as written.*	
	Update #1	
POA Update Frequency	Date of Next Update	Date Updated
POA Updated by		
Noteworthy Items:		

When inspecting a bridge with a POA in place, the primary goal is to understand the issues described in the POA and document change in those conditions. In the event no significant change has occurred, i.e. conditions have not worsened or have not been repaired, the POA Update Log should be filled out by the inspector as documentation the bridge was looked at and the POA is still valid.

In the event conditions outlined within a POA have changed, an inspector should note the change in conditions in Section 2 of the POA as previously described and submit the POA to the Professional Engineer representing the bridge owner. The Professional Engineer will then be responsible for reviewing the inspector's findings and deciding about the appropriate actions necessary. If the Professional Engineer representing the bridge owner deems it necessary to update the POA, the update will be made in a new POA form and the previous form will become an attachment. This allows an individual not as familiar with the bridge to understand the issues and potential remediation has occurred over time at a bridge. All POA updates must have supporting documentation outlining the reasons for the update. When the POA update is complete the Updated POA and documentation supporting the update must be submitted to KDOT-BLP and uploaded in the bridge record in the Bridge Inspection Portal. At a minimum, the following documentation may be required:

- Updated POA
- All attachments included with the original POA
- Current digital photographs of the bridge, substructure elements, upstream, and downstream channel conditions (geo-referenced preferred)
- Countermeasure design calculations sealed by a licensed Professional Engineer (if necessary)
- Measurements of present scour conditions
- Concise narrative describing present scour conditions and recommendations

It is the sole responsibility of the bridge owner and their Professional Engineer to update the POA as necessary. However, the updated POA submitted to KDOT-BLP will be reviewed for completeness and a status report for the POA may be sent to the FHWA at their request.

The routine inspectors are responsible for updating the POA in Section 2 whether there are site specific changes or not. If the conditions have not changed then the inspector should indicate the plan is still valid (remains unchanged) in the POA Update Log (above). In the event conditions have changed then the inspector must document the change within Section 2 of the POA and thoroughly photograph the changes. Once the document is updated, it must be submitted back to **KDOT.BLPBridge@ks.gov**, (subject line –**Scour Critical Change**) where the updates will be reviewed and a new POA document reflecting these updates will be issued.

POA Retirement

The POAs currently in place were generated as part of the KLBEP. The information contained within the POA was determined using the information and data available at the time the POA was written. In the event a bridge owner and Bridge Inspection Team Leader feels a POA is no longer necessary, Section 2 of the POA should be filled out with an explanation or reasoning of the disagreement and submitted to the PE representing the bridge owner with any supporting documentation for review and the POA Retirement Sheet for Local Bridges. There are multiple reasons and circumstances which may warrant the retirement of a POA. These reasons and the documentation associated with each are outlined below. It should be noted that while all of the documentation may not be required to be submitted along with the updated POA, KDOT-BLP may request copies as necessary.

1. **General disagreement with POA results**
    a. Updated POA
    b. Bridge plans showing foundation information
    c. Scour analysis
    d. Current digital photographs of the new bridge, substructure elements, upstream, and downstream channel conditions (geo-referenced preferred)
    e. Routine inspection report
    f. Completed POA Retirement Form

2. **Bridge Replacement (no retirement form needed)**
    a. Current digital photographs of the new bridge, substructure elements, upstream, and downstream channel conditions (geo-referenced preferred)
    b. As-built plans for the new bridge
    c. Scour analysis for the new bridge
    d. Inventory inspection report

3. **Bridge Removal (no retirement form needed)**
    a. Current digital photographs of the bridge site and upstream and downstream channel conditions (geo-referenced preferred)
    b. Other supporting documentation as outlined in Chapter 1

4. **Countermeasure Implementation**
    a. Updated POA
    b. Photographs of the site conditions prior to countermeasure installation
    c. Current digital photographs of the installed countermeasure(s) (geo-referenced preferred)
    d. Current digital photographs of the bridge, substructure elements, upstream, and downstream channel conditions (geo-referenced preferred)

e. Countermeasure design calculations sealed by a licensed Professional Engineer
f. All attachments included with the original POA
g. Completed POA Retirement Form

5. **Bridge Plans have been located or Non-Destructive Testing has been performed (Unknown Foundations POA)**
   a. Results from a scour evaluation indicating general and local scour depths
   b. Documentation indicating foundation depth, type, and bearing material sealed by a licensed Professional Engineer
   c. Current digital photographs of the bridge, substructure elements, upstream, and downstream channel conditions (geo-referenced preferred)
   d. Completed POA Retirement Form

At a minimum, the Updated POA and the fully completed POA Retirement Form must be submitted in order to retire a POA. In some cases, KDOT-BLP may request additional information depending on the circumstances associated with the retirement of the POA. The intent of the POA Retirement Form is to show the Professional Engineer and Bridge Inspection Team Leader are in agreement the POA should be retired and what the other affected NBIS Items should be assigned. The bridge owner's Professional Engineer and Bridge Inspection Team Leader will be responsible for making a determination of whether the POA should be retired, will assign the appropriate NBIS information, and submit all documentation associated with the POA to KDOT BLP.

It is the sole responsibility of the bridge owner, their engineer, and their Bridge Inspection Team Leader to ensure the POA is no longer necessary. However, the information package submitted to KDOT-BLP will be reviewed for completeness and a status report for the POA may be sent to the FHWA at their request.

Kansas Department of Transportation - Bureau of Local Projects

Plan of Action Retirement Sheet for Local Bridges

FHWA Bridge No.: _____ Bridge Owner: _____

Local Bridge ID.: _____ Year Built: _____

Feature Crossed: _____ Date POA was Issued: _____

Facility Carried: _____ Date POA was Retired: _____

NBI Condition Ratings:

Previous Item 113:		Current Item 113:	
Previous Item 60:		Current Item 60:	
Previous Item 61:		Current Item 61:	
Previous Item 71:		Current Item 71:	

Inspection Frequency:

Previous Inspection Frequency: _____ Current Inspection Frequency: _____

Special Inspection Performed? ☐ Yes ☐ No Date of Special Inspection: _____

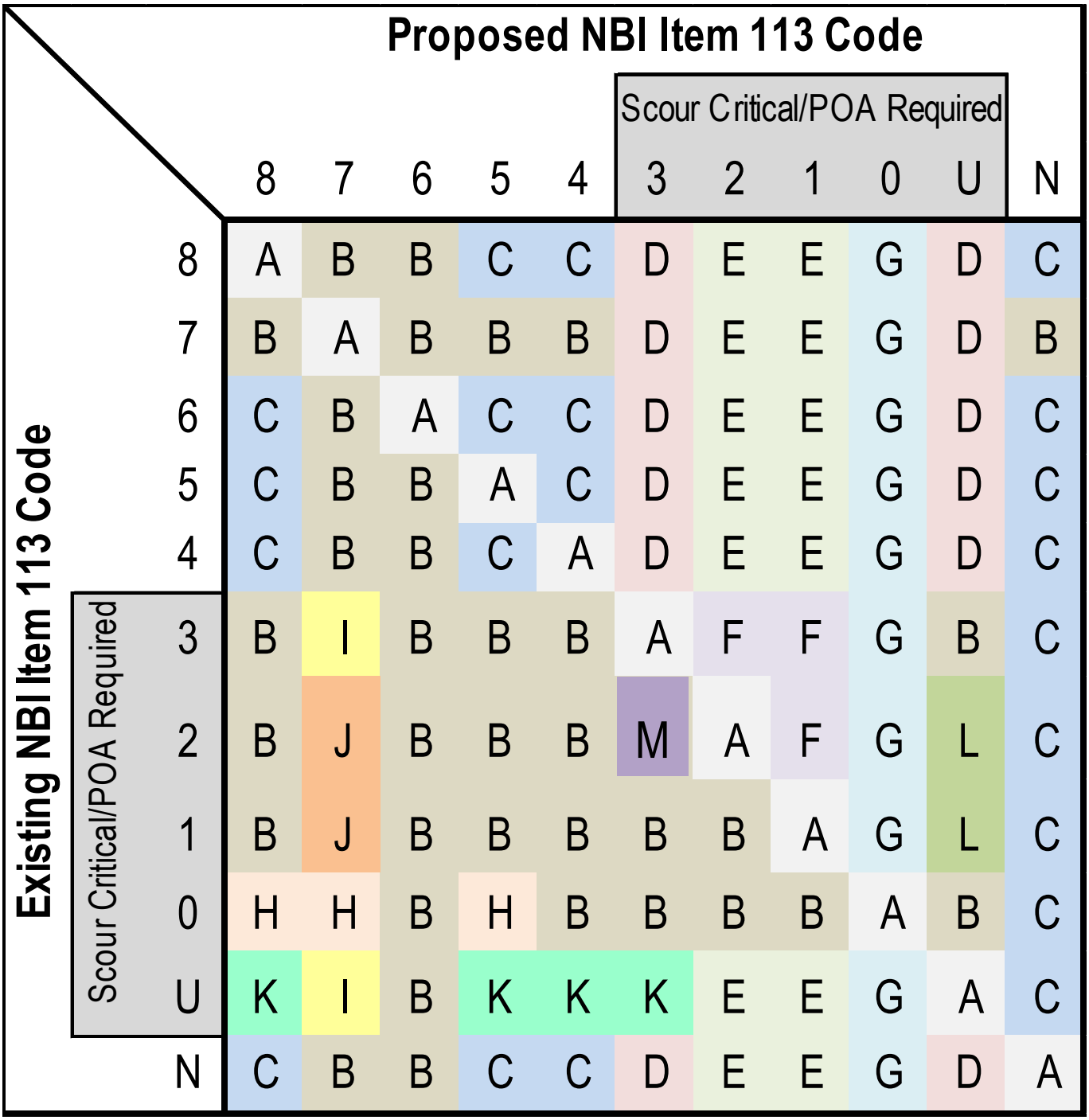
Additional Comments *(Include any countermeasure design details, assumptions, and hand calculation references)*

Bridge Inspection Team Leader:	
Professional Engineer:	

(PE Seal & Date)

This document shall accompany the updated Plan of Action (See Section 2 of the Plan of Action) within the owner's bridge records to reflect the corrective action taken by the bridge owner as noted by the Bridge Inspection Team Leader and Engineer licensed in the State of Kansas shown above. When implementation and inspection is complete, attach this form to the most current POA and email it to BLP_BRIDGE@KSDOT.ORG.

Issued August 2013



Item 113 Documentation Matrix

A: No action necessary

B: Not allowed

C: Provide documentation required to justify recommended code as follows:

1) Results from scour evaluation indicating general and local scour depths.
2) Documentation indicating foundations depth, type, and bearing material, i.e. bridge plans, geotechnical report, NDT results, etc.
3) Current photographs of the bridge and substructure elements.
4) Current photographs of the upstream and downstream channel conditions

D: Plan of Action required. Provide documentation necessary to develop POA as follows and coordinate with bridge owner.

1) Results from scour evaluation indicating general and local scour depths.
2) Documentation indicating foundations depth, type, and bearing material, i.e. bridge plans, geotechnical report, NDT results, etc.
3) Current photographs of the bridge and substructure elements.
4) Current photographs of the upstream and downstream channel conditions
5) Three potential countermeasures that could be implemented to correct issue or protect bridge from scour, as approved by licensed PE in Kansas.

E: Plan of Action and Critical Inspection Finding required. Notify bridge owner of findings and provide documentation necessary for POA as follows:

1) Complete CIF form detailing issue(s) at bridge, see KDOT BLP Bridge Inspection Manual page E.6 (Appendix E), and deliver to owner immediately.
2) Current photographs of the bridge and substructure elements.
3) Current photographs of the upstream and downstream channel conditions
4) Three potential countermeasures that could be implemented to correct issue or protect bridge from scour, as approved by licensed PE in Kansas.

F: Plan of Action is in place but has not been implemented. Conditions have degraded causing stability issues with bridge. Provide documentation necessary to justify recommended code as follows:

1) Complete CIF form detailing issue(s) at bridge, see KDOT BLP Bridge Inspection Manual page E.6 (Appendix E), and deliver to owner immediately.
2) Current photographs of the bridge and substructure elements.
3) Current photographs of the upstream and downstream channel conditions
4) Three potential countermeasures that could be implemented to correct issue or protect bridge from scour, as approved by licensed PE in Kansas.
5) Updated Plan of Action inserted into bridge packet and sent to KDOT BLP.

G: Bridge has collapsed. Ensure proper closure measures are in place in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), state, and local statutes.

H: Inventory inspection is required to bring bridge back in service with scour analysis/assessment.

I: Plan of Action is in place and corrective measures have been implemented. Provide documentation necessary to retire POA as follows:

1) General countermeasure design specifications signed and sealed by a PE licensed in Kansas.

2) Photographs of the site conditions prior to countermeasure installation.
3) Current photographs of the bridge, substructure elements and installed countermeasures.
4) Current photographs of the upstream and downstream channel conditions
5) Updated Plan of Action inserted into bridge packet and sent to KDOT BLP.

J: Plan of Action and Critical Inspection Finding is in place and corrective measures have been implemented. Provide documentation necessary to retire POA as follows:

1) General countermeasure design specifications signed and sealed by a professional engineer licensed in the state of Kansas.
2) Photographs of the site conditions prior to countermeasure installation.
3) Current photographs of the bridge, substructure elements and installed countermeasures.
4) Current photographs of the upstream and downstream channel conditions
5) Updated Plan of Action inserted into bridge packet and sent to KDOT BLP.
6) Original CIF form signed by bridge owner.

K: Bridge plans have been located and a scour analysis/evaluation has been performed. Provide documentation required to justify recommended code.

1) Results from scour evaluation indicating general and local scour depths.
2) Documentation indicating foundations depth, type, and bearing material, i.e. bridge plans, geotechnical report, NDT results, etc.
3) Current photographs of the bridge and substructure elements.
4) Current photographs of the upstream and downstream channel conditions
5) Three potential countermeasures, as approved by a licensed PE in Kansas, that could be implemented to correct issue or protect bridge from scour if POA is necessary, i.e. Item 113 is recommended to be 3.

L: Corrective action has been taken per a critical inspection finding. Foundation depths are still unknown. Provide documentation necessary to justify recommended code change.

1) Photographs of the site conditions prior to countermeasure installation.
2) Current photographs of the bridge, substructure elements and installed countermeasures.
3) Current photographs of the upstream and downstream channel conditions
4) Updated Plan of Action inserted into bridge packet and sent to KDOT BLP.
5) Original CIF form signed by bridge owner.

M: Allowable **ONLY** on a case by case basis and is dependent upon approval by KDOT BLP Bridge Team. Repairs are NOT to HEC 23 guidelines, but are sufficient to alleviate a Critical Inspection Finding. Provide documentation necessary to justify recommended code change.

1) Photographs of the site conditions prior to countermeasure installation.
2) Current photographs of the bridge, substructure elements and installed countermeasures.
3) Current photographs of the upstream and downstream channel conditions
4) Updated Plan of Action inserted into bridge packet and sent to KDOT BLP.
5) Original CIF form signed by bridge owner.

Bridge Inspection Office Review for Coding NBI Item #113

Is Bridge Over Waterway?
NO
-Review NBI Item #42B and #113 in Field using BLP's BIM
YES

Should NBI Item #42B=5,6,7,8 or 9?
YES
-Code NBI Item #42B using BLP's BIM
NO
-Code NBI Item #113="N"
Coding of NBI Item #113 Complete

Is Scour Assess/Analysis In Bridge Record?
NO
YES

Is NBI Item #113 ≤3 or "U"?
YES
NO

Is Scour Plan of Action in Bridge Record?
NO
YES

Is Scour Plan of Action Stored Seperately?
NO
YES
-Notify KDOT BLP of Potential Incomplete Records
-DO NOT CHANGE NBI Item #113
With Owner's Concurrence, either
1) Make Copy and Add to Packet, or
2) Add Original to Packet
Review Scour Plan of Action

Is NBI Item #113≤2?
NO
YES

Is Critical Inspection Finding in Bridge Record?
YES
NO
Review Critical Inspection Finding

Is Critical Inspection Finding Stored Seperately?
NO
YES
With Owner's Concurrence, either
1)Make a Copy and Add to Packet, or
2)Add Original to Packet
-Notify KDOT BLP of Incomplete Records

Review NBI Item #113 in Field using BLP's BIM

Does NBI Item #113 Need To Be Changed?
YES
NO

Does NBI Item #113="U"?
YES
NO

Are Bridge Foundations Known by Plans or Other Means?
YES
NO
Code NBI Item #113=6
-Advise Owner to Consult KS PE to Revise Scour Plan of Action
-Notify KDOT BLP & Transystems of Ratings Change
Leave NBI Item #113="U"

-Scour Plan of Action is Not Req'd.
-Review NBI Item #113 in Field using BLP's BIM

Does NBI Item #113 Need to be Changed?
YES
NO
-Take Photographs & Measurements

Should NBI Item #113=0 (Failed/Closed)
YES
NO
-Bridge has Failed
-Bridge is Closed to Traffic
-Complete Critical Inspection Finding using BLP's BIM
-Take Photographs
-Code NBI Item #113=0

Should NBI Item #113≤3 Due to Observed Scour at the Bridge Site?
YES
NO
-Take Photographs & Measurements
-Code NBI Item #113 using BLP's BIM

Should NBI Item #113=0 (Failed/Closed)
YES
NO
-Bridge has Failed
-Bridge is Closed to Traffic
-Complete Critical Inspection Finding using BLP's BIM
-Code NBI Item #113=0

Should NBI Item #113≤3 Due to Observed Scour at the Bridge Site?
YES
NO
-Take Photographs & Measurements
-Notify Owner of Needs for Immediate Action
-Advise Owner to Consult KS PE to Perform Scour Plan of Action
-If NBI Item #113≤2, complete Critical Inspection Finding using BLP's BIM
-Code NBI Item #113 using BLP's BIM
-Notify KDOT BLP & Transystems of NBI Item #113 Ratings Change

-Code NBI Item #113 using BLP's BIM
-Revise/Retire Scour Plan of Action
-Retire Critical Inspection Finding If One Exists
-Revise Scour Assess./Analysis

-Notify Owner of Needs for Immediate Action
-Advise Owner to Consult KS PE to Revise Scour Plan of Action
-If NBI Item #113≤2, Complete Critical Inspection Finding using BLP's BIM
-Code NBI Item #113 using BLP's BIM

-Take Photographs & Measurements If Required
-Fill Out Section 2 on Scour POA if NBI Item #113 Rating Changes or Complete POA Update Log for NBI Item #113 Rating Change
-Sign, Date, Scan, Email POA Section 2 Page to KDOT BLP & Transystems

Coding of NBI Item #113 Complete

Coding of NBI Item #113 Complete

LEGEND

- Begin Office Review
- Decision Box
- Coding NBI Item #113 Complete
- Review in Field
- Instruction Box

BLP = Bureau of Local Projects

BIM = Bridge Inspection Manual

NBI = National Bridge Inventory

10.29

Chapter

11

FRACTURE CRITICAL MEMBER INSPECTIONS

FRACTURE CRITICAL DEFINITIONS

Fracture Critical Member (FCM): A steel member in tension, or with a tension element, whose failure might cause a portion of or the entire bridge to collapse.

Fracture Critical Member Inspection: A hands-on inspection of a FCM or member components.

Hands-on: An inspection within 18 inches or less of the FCM. A hands-on inspection uses visual techniques that may be supplemented by nondestructive testing.

Tension: A force that acts along the longitudinal axis of a member and tends to pull the member apart, acting across the entire cross section of the member.

FRACTURE CRITICAL MEMBER INSPECTION REQUIREMENTS

The following activities are required for all Fracture Critical Member Inspections on the Kansas local system.

A. **Fracture Critical Member Inspection -** The Fracture Critical Member Inspections shall be conducted in accordance with federal regulations. Additionally, the Consultant should refer to the references listed in Appendix A. All Fracture Critical Member Inspections shall be consistent with the following:
   1. A Fracture Critical Member Inspection shall be performed on all FCMs. Any attachment having a length in the direction of the tension stress greater than four inches welded to the tension area of a component of a FCM shall be considered part of the tension component and shall be considered fracture critical.
   2. All FCMs shall have a hands-on inspection.
   3. All Fracture Critical Member Inspections shall be led by a Fracture Critical Member Inspection Team Leader.
   4. At least one non-destructive testing (NDT) method including, but not limited to, dye penetrant, magnetic particle, eddy current, or ultrasound should be conducted on any suspected crack discovered during the Fracture Critical Member Inspection to aid in determining the presence and extent of cracks, discontinuities, deficient welds, or other irregularities.
   5. Any observed or appreciable active section loss on members which are normally analyzed to determine the safe load carrying capacity of the bridge shall be measured and documented sufficiently to allow for future analysis of the structure. Where active corrosion has reduced the section of an element or gusset plate, measurements shall be taken at the areas where the most section loss has occurred. Appreciable section loss shall be defined as a reduction of the member's section by ten percent (10%) or more. The documentation shall include a photograph of the area of section loss showing the outline of the corroded area and member name using the member naming convention found in Appendix B. All outlines shall be done in a permanent paint pen using a color that will be readily visible against the color of the member being marked. Where there has been no observed section loss, no measurements are required. Painted over areas of section loss having been measured by previous inspections need not be re-measured or shown if there are no indications of active corrosion.
   6. All loose or missing rivets or bolts shall be noted in the Fracture Critical Member Inspection Report.

7. All steel pier caps (either box or I-section), including unusual connection details, shall be inspected for cracks and poorly designed or fabricated details. For a box section, the Fracture Critical Member Inspection shall include inspection of both the interior and exterior of the box section. Removal and replacement of all access hatches are the responsibility of the inspector. When replacing the hatches, they shall be reinstalled to a similar condition as they were found in.
8. The Fracture Critical Member Inspection for all steel trusses shall include a hands-on inspection of all FCMs and gusset plates. The inspection team shall also examine each gusset plate from the side or profile. If it appears any gusset plate or member is out of plane, measurements shall be taken using a straight edge to quantify the severity of out of plane deflections. Photographs of the out of plane deflections shall be included in the Fracture Critical Member Inspection Report.
9. The Fracture Critical Member Inspection Team Leader shall be responsible for identifying and noting all visible defects whether as a result of deterioration, original construction, or original design. They shall also be responsible for identifying and noting areas of potential failure as a result of deterioration or inadequate details. This shall include the removal of debris including, but not limited to, heavy rust, organic waste, lead based paint or steel grit. The Fracture Critical Member Inspection Team Leader will not be responsible for identifying and noting structural conditions which occur after the date of their inspection, providing the condition was not visibly evident at the time of their inspection.

B. **Fracture Critical Member Inspection Report -** The Fracture Critical Member Inspection Team Leader shall develop a Fracture Critical Member Inspection Report for each structure using the BLP Fracture Critical Member Inspection Form. At a minimum, the report shall include the following:
   1. Inspection notes listing location and identification of all observed deficiencies, photographs of all applicable found or typical deficiencies, and recommendations in the spaces provided.
   2. 11”x17” drawings showing plan and elevation views of the bridge and identifying which members are FCMs, and the locations of all photographs.
   3. Inspection procedures used, including access equipment.
   4. The type and results of NDT method(s) performed.

   Provide one individual bound copy of the Fracture Critical Member Inspection Report to the bridge owner for each bridge undergoing a Fracture Critical Member Inspection to be filed with its applicable bridge record kept with the bridge owner.

C. **Fracture Critical Member Inspection Data Input** - All work shall be performed, and the data entered into the Bridge Inspection Portal (BIP), within 90 days of the required inspection date. Required reports and assembly of updates to the bridge record shall be completed within 90 days of the completion of the field inspection.

FRACTURE CRITICAL MEMBER NAMING CONVENTION

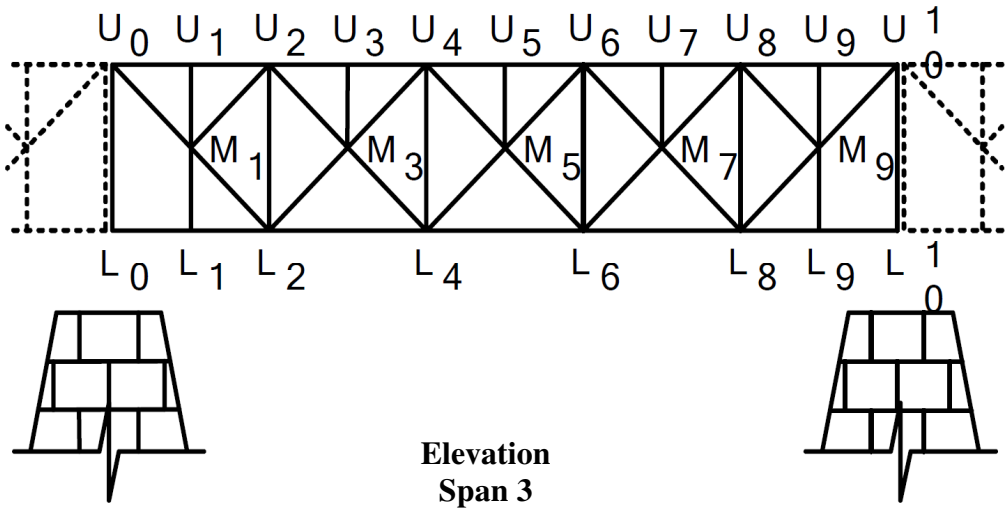
This section is intended to provide consistency in the naming and numbering convention of the FCMs encountered during a Fracture Critical Member Inspection. The naming convention shall follow the listed abbreviations below.

Bridge Member	**Example**
Arch=A	A1, A2
Truss=T	T1, T2
Span=SP	SP1-SP4
Unit=UN	UN1, UN2-UN3
Abutment=AB	AB 1, AB2
Pier=P	P1, P2, P3
Beam=B	B1 – B6
Diagonal=M	M3, M5
Girder=G	G1 - G2
Floorbeam=FB	FB1 – FB15
Stringer =S	S1 – S4
Upper=U	U2 - U5
Lower=L	L5 – L10
Vertical=V	V1, V5, V9
Portal=PT	PT1
Wind Bracing=WB	WB0-WB3
Bearing=BRG	BRG1, BRG2
Expansion Joint=JT	JT1, JT2
Cable=C	C1 - C6
Pin and Hanger=PH	PH1, PH2

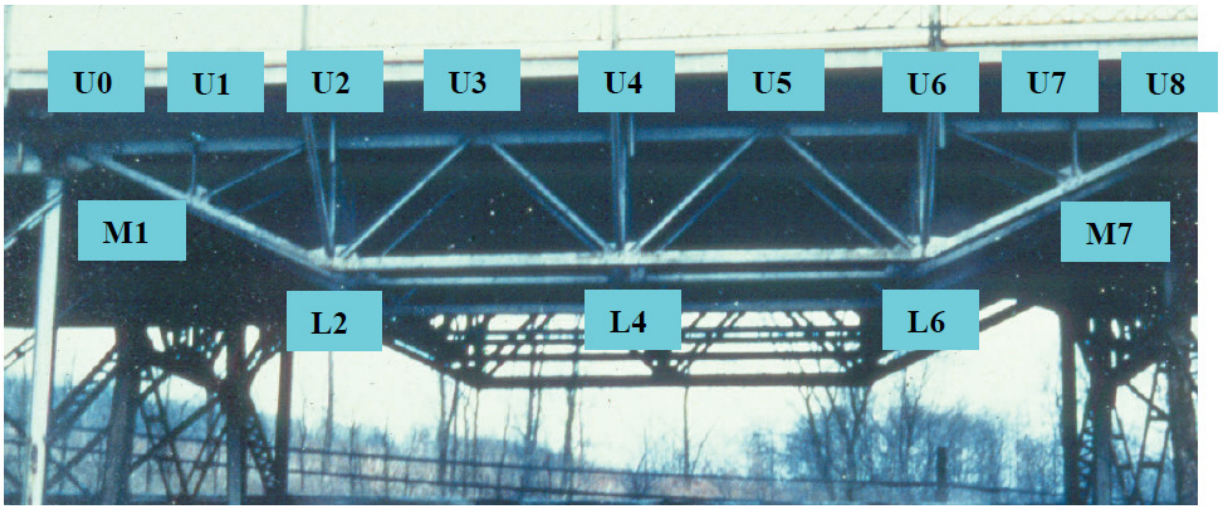
Once the type of member is determined and the proper abbreviation is selected, members will be numbered in accordance with BLP and Kansas stationing standards and follow cardinal directions from south to north or west to east. Abbreviations can also be used in combination to better achieve a more specific location as in the following examples. Please see the following example diagrams.

Examples:

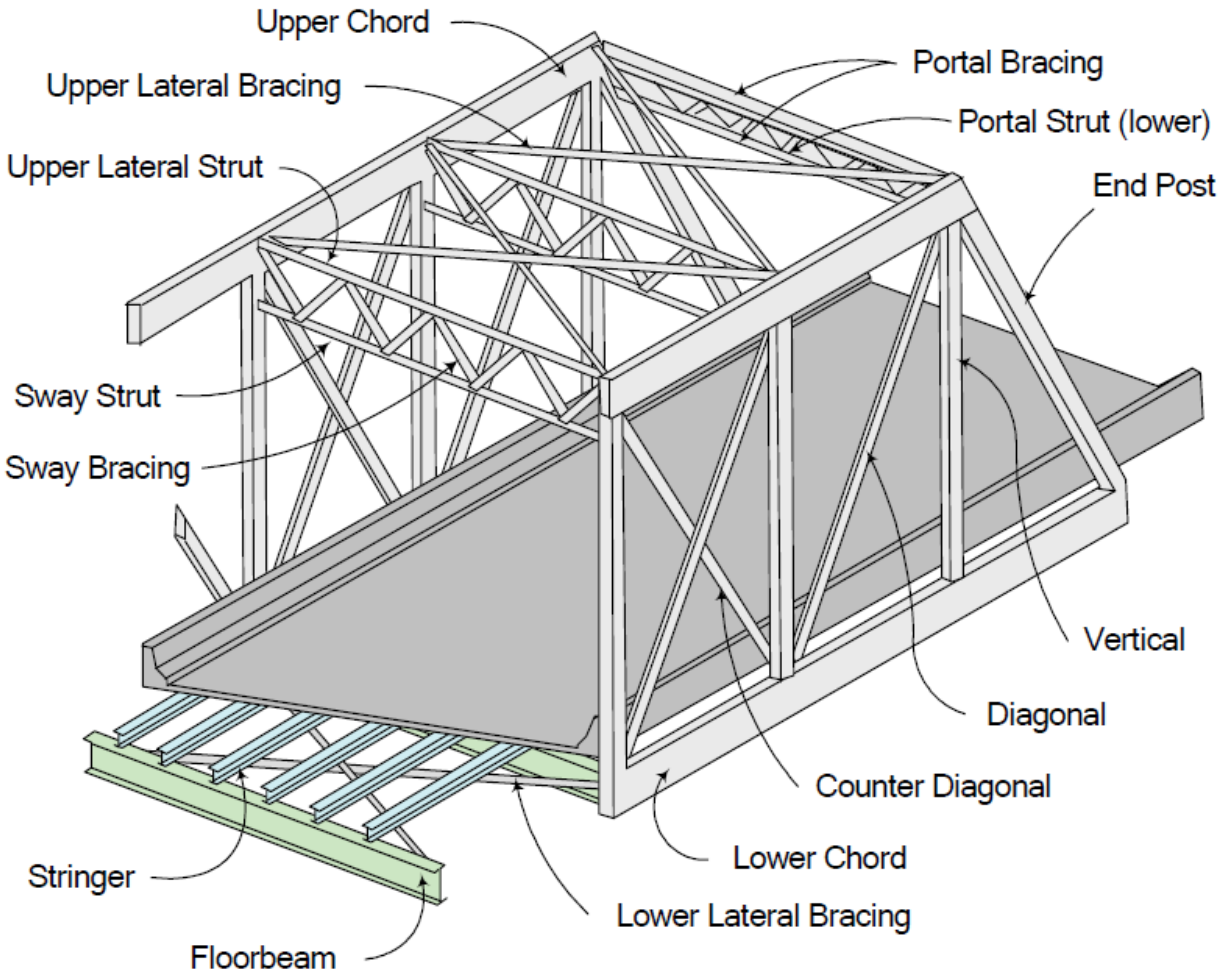
Member	**Designation**
West Arch	A1
East Truss	T2
South Portal	PT1
3rd Diagonal/E. Arch	A2/M3
South Unit/2nd Span from South/3rd Girder from West	U1/SP2/G3
West Truss/North Bearing	T1/BRG2
2nd Unit from South/South Span/4th Vert. from South	U2/SP1/V4

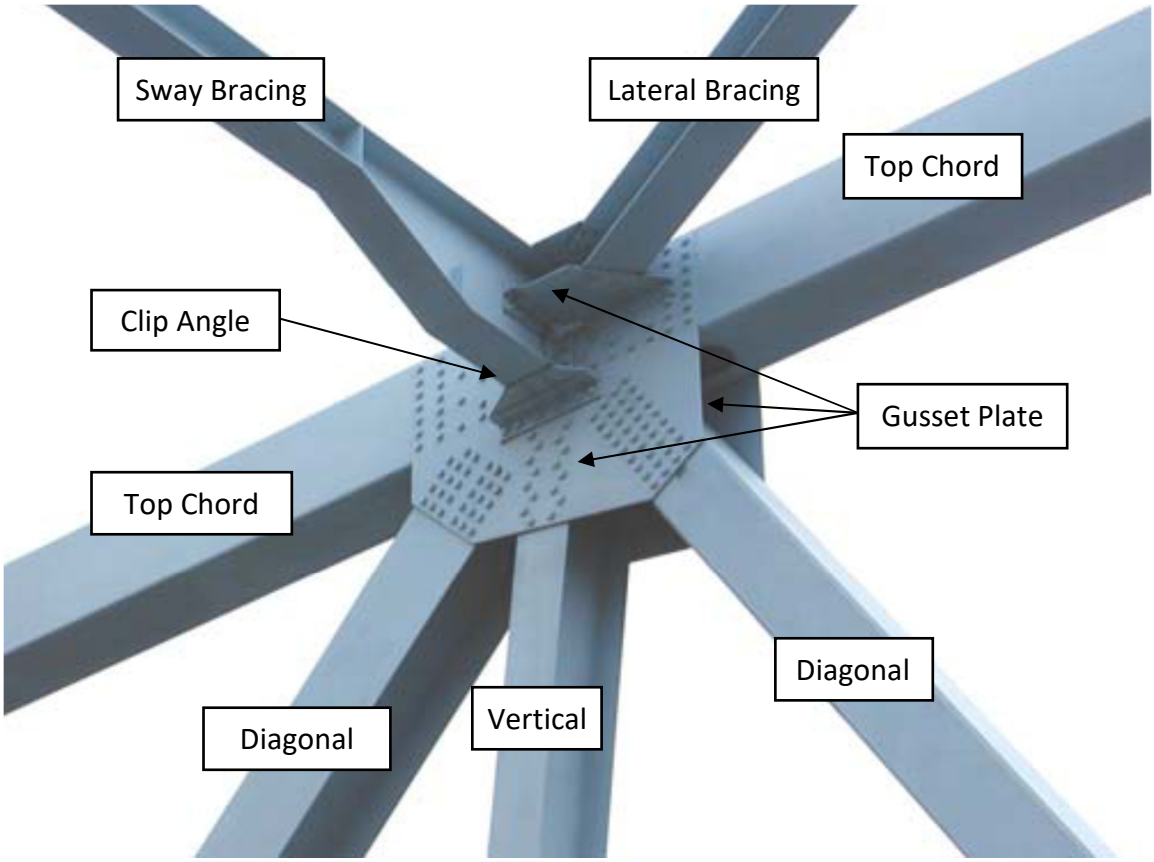


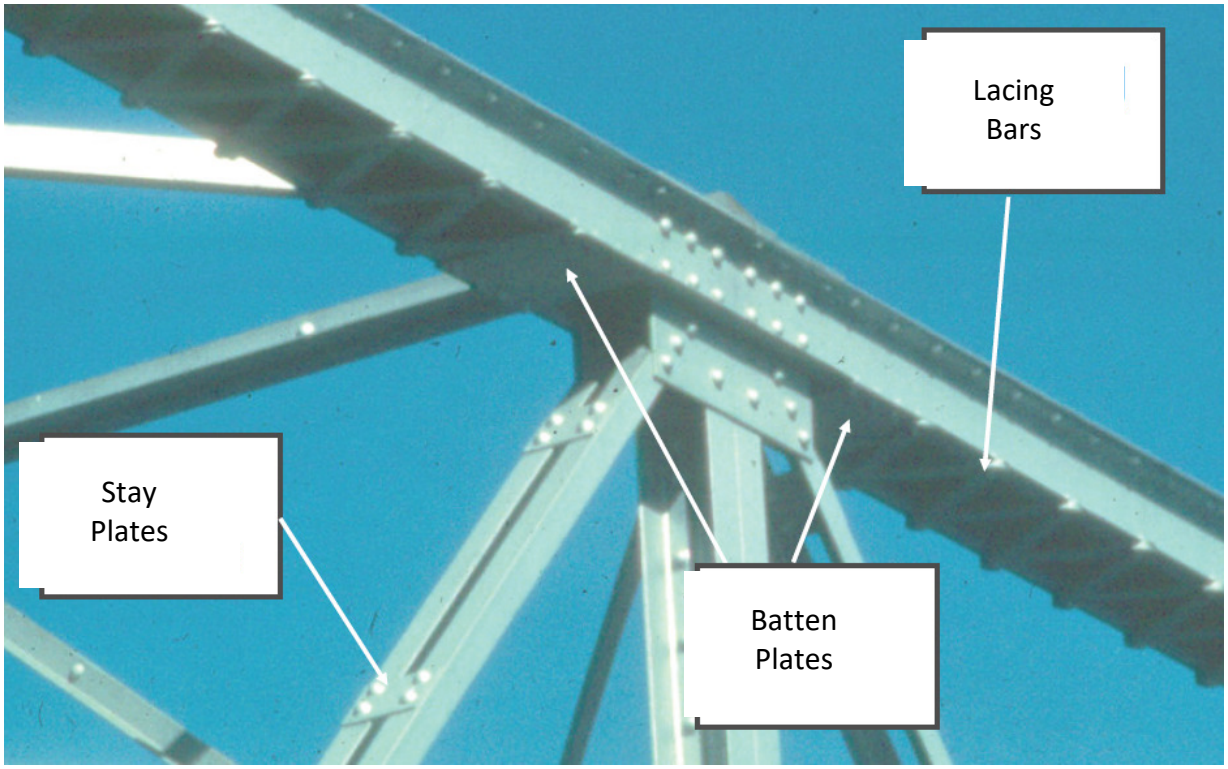
Elevation
Span 3



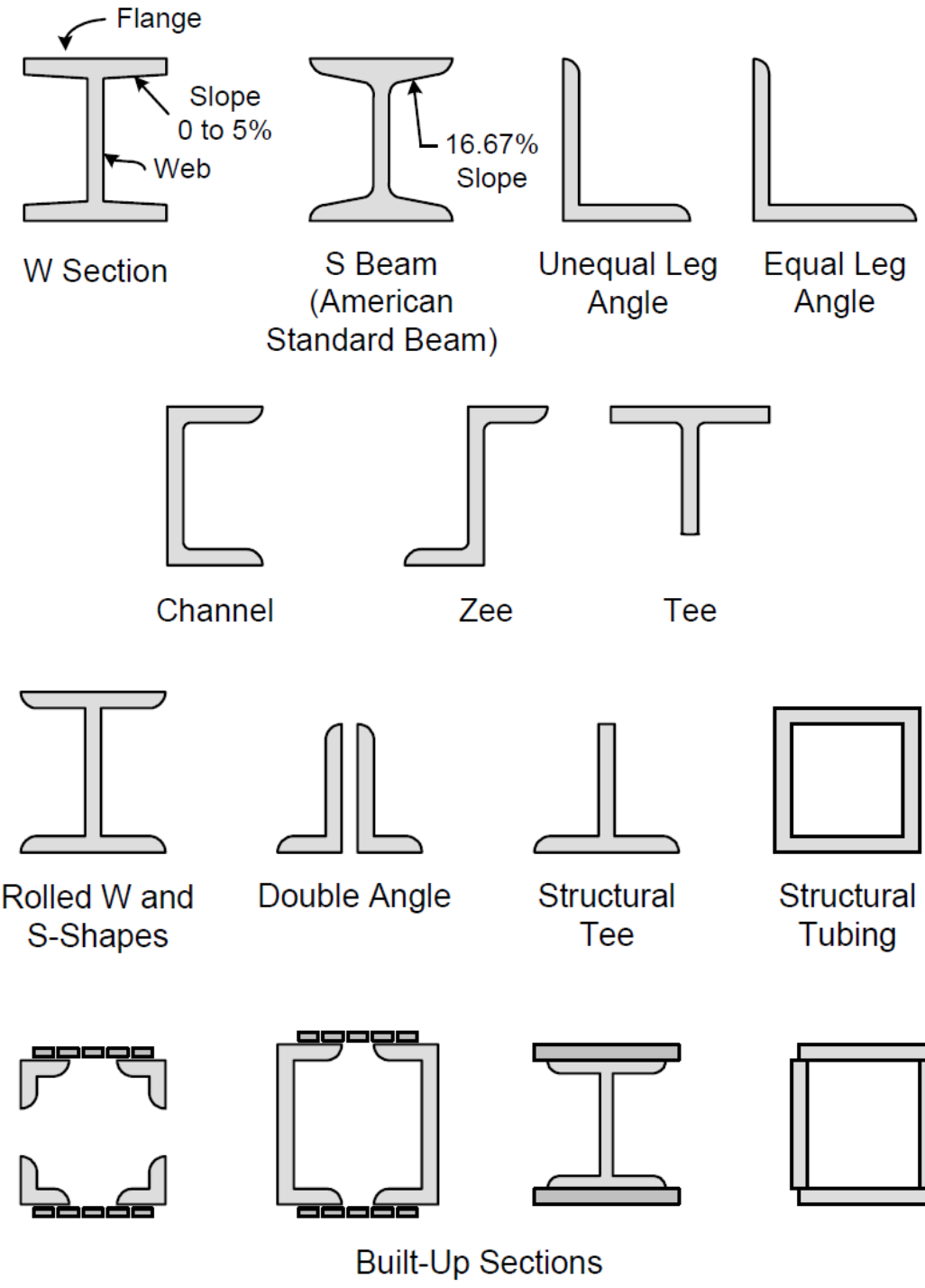
COMMON TRUSS ELEMENTS




Sway Bracing
Lateral Bracing
Top Chord
Clip Angle
Gusset Plate
Top Chord
Diagonal
Diagonal
Vertical


Lacing Bars
Stay Plates
Batten Plates

COMMON STEEL SHAPES USED IN TRUSSES



THINGS TO LOOK FOR IN FRACTURE CRITICAL MEMBER INSPECTIONS

Tension Members

For truss members subjected to tensile loads, attention should be given to the following locations:

- Check for section loss and cracks.
- For box-shaped chord members, check inside for debris and corrosion, cracks or section loss.
- Examine eyebar heads for cracks in the eyes and in the forge zone.
- Check loop rods for cracking where the loop is formed.
- Where multiple eyebars make one member, check to see if the tension is evenly distributed - each eyebar element should be perfectly parallel and evenly spaced to adjacent elements.
- Check eyebars or loop rods where attachments are welded to them, especially if such attachments connect the eyebars together.
- Determine whether the spacers on the pins are holding the eyebars and loop rods in their proper positions.
- Look for repairs, especially welded repairs, if they have been applied to steel tension members. Base metal cracks can easily develop at these locations.
- Check the alignment of the members, make sure they are straight and not bowed - this could be a sign of pier movement, collision damage or unintentional force reversal.
- A member may not be acting as designed such as a buckled bottom chord member in simply supported truss. Try to determine the cause of different loading and look at adjacent members. They may be overstressed.
- Observe the counter diagonals under live load for excessive wear and abnormal rubbing where the counter diagonals cross.

Fatigue Prone Details

For fatigue prone details, attention should be given to the following locations:

- Check ends of welded cover plates on tension flanges.
- Check the welded attachment of signs, railings, and utilities in tension zone.
- Check the welds on any repair or reinforcement plate attached to the truss member.
- Check for cracks at the copes and blocked flanges at ends of floorbeams and stringers.
- Check the floorbeam and stringer connection angles for cracks. This is a very critical load path.
- Check the horizontal gusset plate connections of the lateral bracing to the floorbeam flanges or webs.
- Check the ends of the vertical truss members and the end gusset plates for cracks.
- Check the ends of the vertical and diagonal eyebar members for cracks.
- Check pins on suspended spans.
- Check all tack welds, for example, between gusset plates and main members and between floorbeam and stringer connections. The existence of tack welds should be immediately brought to the attention of the bridge engineer.

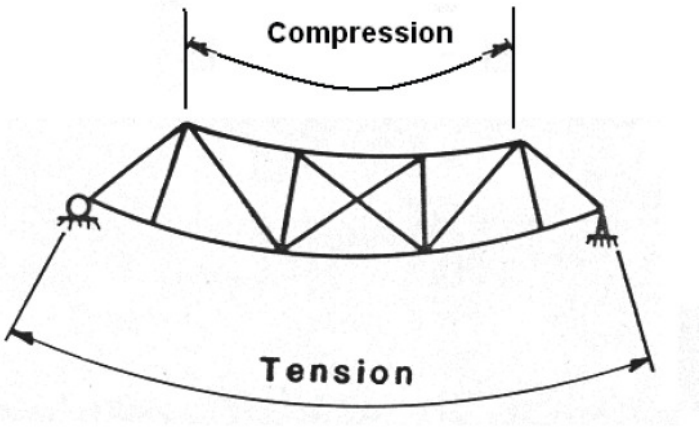
Floor System

The floor system on a truss contains floorbeams and, possibly, stringers. These members function as beams and are subjected to bending, shear and out-of-plane bending stresses. Distortion induced fatigue cracks have also developed in the webs of many floorbeams at connections to truss bridge lower chord panel points when the stringers are placed above the floorbeams. The webs of these floorbeams at the connections and adjacent to flanges and stiffeners need to be inspected routinely.

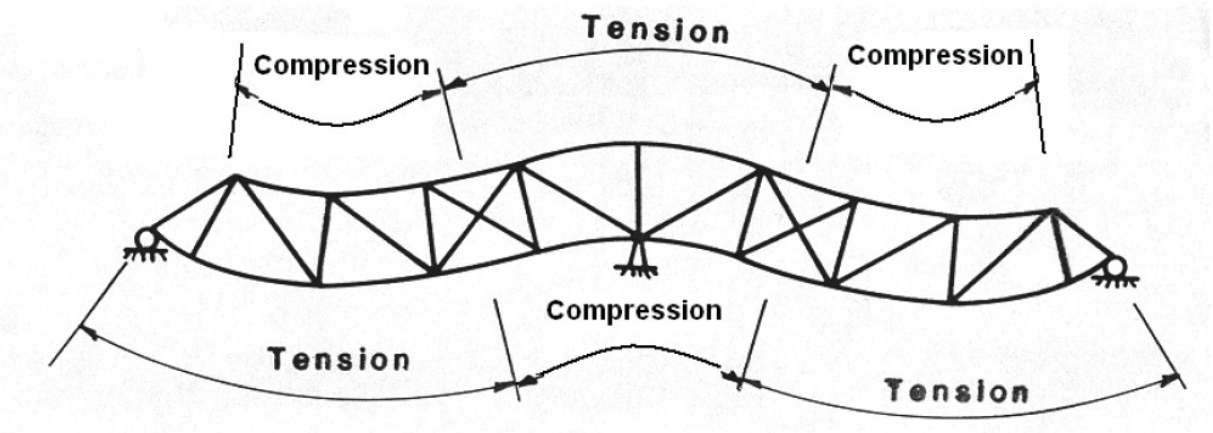
For steel truss floor systems, attention should be given to the following locations:

- Check the end connections of floorbeams for corrosion as they are exposed to moisture and de-icing chemicals from the roadway.
- Check the floorbeams and stringers for corrosion, particularly under open grid decks.
- Check floor system member flanges and webs for corrosion and cracks.
- During the passage of traffic, listen for abnormal noises caused by moving members and loose connections with the passage of traffic.

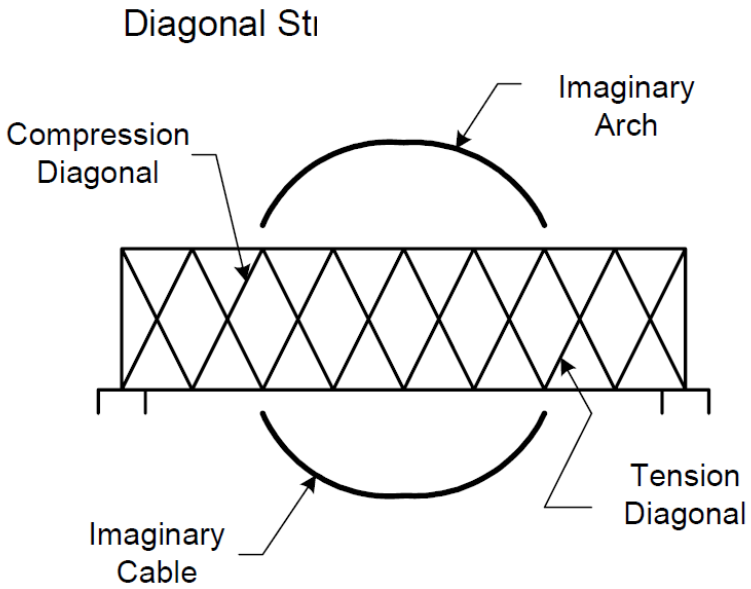
SAMPLE TENSION/COMPRESSION "GO-BY" DIAGRAMS



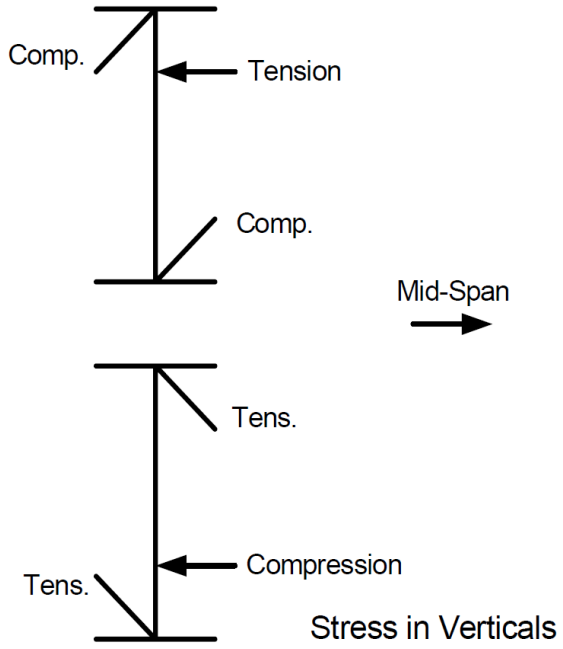
SIMPLE SPAN FORCES



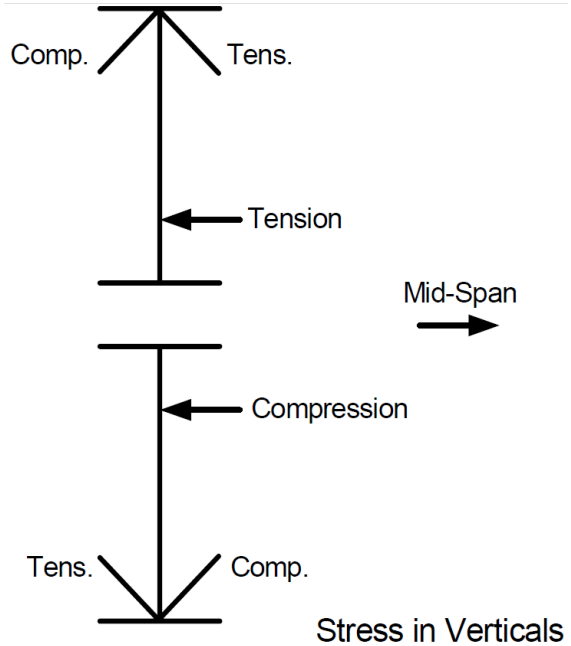
CONTINUOUS SPAN FORCES



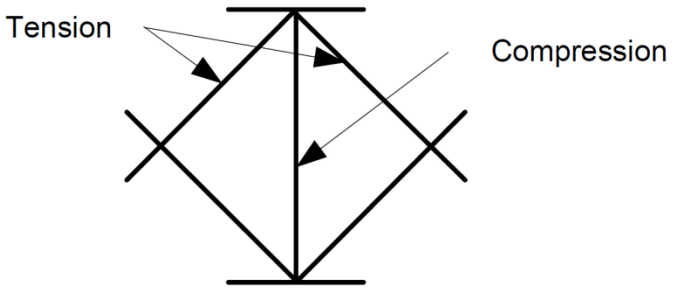
DIAGONAL STRESS PREDICTION METHODS



Stress in Verticals



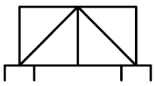
Stress in Verticals



Counters

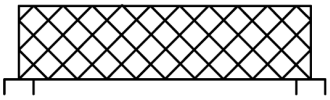
Stress in Verticals

COMMON TRUSS CONFIGURATIONS

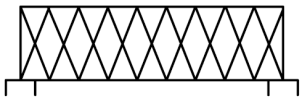


King Post

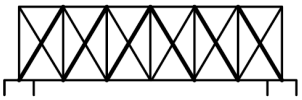
Queen post



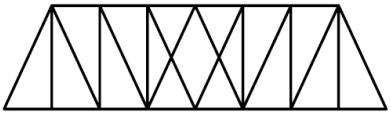
Town



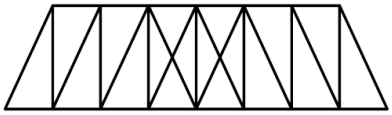
Double Warren



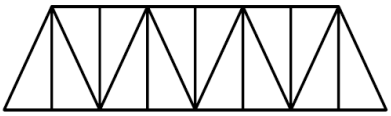
Howe



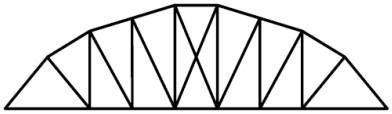
Through Pratt Truss



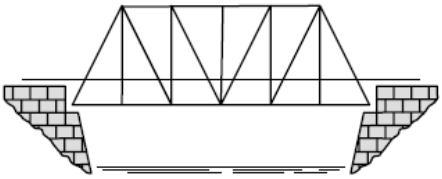
Through Howe Truss

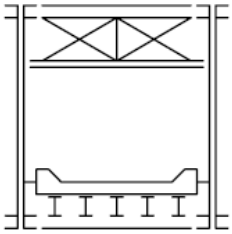


Through Warren Truss
(with verticals)

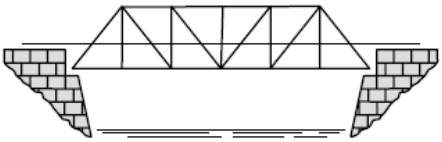


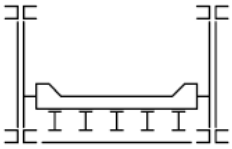
Camel Back Pratt Truss



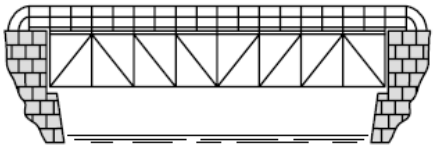


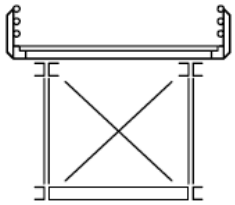
Through Truss





Pony Truss





Deck Truss

Appendix

A

LOCAL ROUTINE BRIDGE INSPECTION SCOPE OF SERVICES AND FORMS

TABLE OF CONTENTS

Disclaimer: Bridge inspections in compliance with KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined bridge inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.* This listing is provided to assist Owners in performing or contracting to have performed bridge inspection services that meet applicable bridge inspection requirements. These terms are not intended or represented by KDOT to constitute a contract or substitute as a professionally drafted contractual agreement. Owners should consult with legal counsel to obtain an appropriate contractual agreement including this scope of services when contracting with a bridge inspection consultant to meet their obligations under 23 C.F.R. § 650 *et seq.*

Scope of Services for Local Routine Bridge Inspections[1]

General

1. Routine Bridge Inspections shall be conducted in accordance with federal regulations and references listed in Attachment A.

2. All National Bridge Inventory (NBI) data items and condition states shall be verified during the inspection and updated. This may require coordination with the City/County ("Owner") on items not observable.

3. City/County bridge inspections are subject to review by the Kansas Department of Transportation (KDOT). If errors or discrepancies are found, the Consultant, at no additional cost (or Owner if the inspection is performed by the Owner), shall be required to make corrections. The KDOT Bureau of Local Projects (BLP) will oversee Quality Control/Quality Assurance (QC/QA) evaluations of bridge records and inspections. Substandard work is grounds for removal of the inspector from the Kansas Local Bridge Inspection Team Leader list.

Number and Type of Bridges for Inspection

4. The Owner has ____ bridges requiring a Routine Inspection.

5. The Owner has ____ bridges requiring an Inventory Inspection.[2]

Specific Requirements for Inspections

6. A Bridge Inspection Team Leader qualified as a Routine Bridge Inspection Team Leader on the Kansas Local Bridge Inspection Team Leader list maintained by KDOT BLP shall be present for the duration of all Routine and Inventory Bridge Inspections.

7. The appropriate standard KDOT BLP Bridge Inspection Form shall be used to record the field inspection data for the inspected bridges.

8. Critical Inspection Findings (CIFs) shall be reported (by telephone or in person) to the Owner immediately. CIFs shall be recorded on the standard KDOT BLP Critical Inspection

[1] Bridge inspections conducted under KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined that inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.*

[2] Bridges not currently in the inventory or bridges that have had major rehabilitation work require an Inventory Inspection according to the KDOT BLP Bridge Inspection Manual.

Findings form. All CIFs shall be in accordance with the Critical Inspection Finding section in Chapter 1 - Bridge Inspection Policies of the BLP Bridge Inspection Manual.

9. During the Routine Bridge Inspection, any weight limit signs found missing, knocked down, damaged to the point of not being legible, or obscured by vegetation; shall be reported the same day to the Owner (by phone or in person). Signs with limits exceeding the maximum allowable loads according to the latest load ratings shall also be reported to the Owner.

10. Review inspection frequencies for the inspected bridges to verify the proper inspection frequencies have been set and followed.

11. Review scour analyses/assessments and scour Plans of Action for the inspected bridges and report if the information is in need of updating.

12. Review load ratings and Load Rating Summary Sheets for the inspected bridges and report if the information is in need of updating.

13. Review latest Fracture Critical Member, Underwater, and Pin & Hanger Inspection information for the inspected bridges and report if the information is in need of updating.

14. Review photographs in the bridge records and add any required photographs not in the bridge records for the inspected bridges. Provide new photographs of items as necessary to adequately document significant deficiencies, changed conditions, or repairs needed. Approach photographs should include the weight limit posting signs at each end of the bridge for all load posted bridges.

Deliverables

15. Required documentation and updates to the records for the inspected bridges shall be completed within __ days of the completion of the field inspection.

16. The inspection data shall be entered in the KDOT BLP Bridge Inspection Portal no later than 90 days following the bridge inspection. All NBI Data Items in the existing database shall be checked while performing data entry and errors in the data shall be corrected. Item 113 Justification Forms, Scour Plans of Action, and Load Rating Summary Sheets, supplied by the Owner for Inventory Inspections, shall be uploaded.

17. The Routine Bridge Inspection Submittal form shall be sealed and signed by the Professional Engineer in charge of the inspection group and submitted along with the Data Validation and Sufficiency Rating Calculation forms to the KDOT BLP Bridge Team at **KDOT.BLPBridge@ks.gov** at the completion of the Routine Bridge Inspection process.

18. By the deadline established by the Owner, provide __ copies of the Bound Report summarizing bridge inspection results of the maintenance recommendation report, and conforming to the requirements contained in Attachment B.

ATTACHMENT A – STUDY PROCEDURES AND DESIGN CRITERIA

The procedures to be used in the field inspection of the bridges were derived from the following reference sources, current editions:

1. American Association of State Highway and Transportation Officials (AASHTO) The Manual for Bridge Evaluation

2. KDOT BLP Bridge Inspection Manual

3. Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges

4. Report No. FHWA-IP-86-2, Culvert Inspection Manual

5. Report No. FHWA-IP-86-26, Inspection of Fracture Critical Bridge Members

6. FHWA Bridge Inspector's Reference Manual

7. Manual on Uniform Traffic Control Devices

ATTACHMENT B – BOUND REPORT REQUIREMENTS

(Suggested report format-owner will modify to meet their needs)

Prepare a bound report summarizing the bridge inspection results. The report should include the following items:

- An introduction stating the time period of the bridge inspections and the names of the persons performing the inspections.
- A table listing each bridge and include the following items:
  - County bridge number
  - NBI number
  - Length
  - Type of structure
  - Features intersected
  - Facilities carried
  - Sufficiency rating
  - Recommended weight limits
  - Existing weight limit signing
  - Date of inspection
  - Inspector name
  - If a load rating update is needed
  - If scour analysis is needed
- A list of bridges having a Critical Inspection Finding
- A table listing all bridges requiring a 12-month inspection frequency, the inspection due date, the reason for the 12-month inspection, and items needing special consideration
- A table listing all bridges requiring a Fracture Critical Member Inspection, a general description of the type of bridge, the type of equipment needed to perform the inspection, and any items of concern
- A table listing all bridges with pin and hanger connections
- A table listing all bridges requiring a special Underwater Inspection and the classification (Type III or Type IV)
- Bridge index map

Prepare a separate bound report listing bridge maintenance items containing:

- Critical maintenance needed to extend the life of the bridge
- Safety concerns
- Routine maintenance items

Structure Inventory & Appraisal (English)

(8) STRUCTURE NO	000000000750320	(1) STATE	20 Kansas	(4) CITY Rural	(3) COUNTY Pottawatomie
LPA Bridge ID	320	LPA Bridge Name		_	(5A) ROUTE ON/UNDER Route On Structure
					HBP FUNDING ELIGIBILITY Replacement

IDENTIFICATION

(5B) ROUTE TYPE			4 County Hwy
(5C) SERVICE TYPE			1 Mainline
(5D) ROUTE NUMBER	01070	(5E) SUFFIX	0 N/A (NBI)
(6A) FEATURE INTERSECTED			KANSAS RIVER
(9) LOCATION			1.5S 1.5E OF BELVUE
(16) LATITUDE			39 ° 11 ' 27,69 "
(17) LONGITUDE			96 ° 08 ' 50,96 "
(2) HIGHWAY AGENCY DISTRICT			District 01 - Topeka
(98A) BORDER BRIDGE STATE			Not Applicable (P)
(98B) BORDER BRIDGE RESPONSIBILITY			%
(99) BORDER BRIDGE STRUCTURE NO.			_
(7) (ROUTE NAME) FACILITY CARRIED			SCHOEMAN ROAD

FUNCTIONAL DESCRIPTION

(26) FUNCTIONAL CLASSIFICATION		07 Rural Mjr Collector
(104) NHS DESIGNATION		0 Not on NHS
(100) STRAHNET DESIGNATION		0 Not a STRAHNET hwy
(110) NATIONAL TRUCK NET		0 Not part of natl netwo
(12) BASE HIGHWAY NET		Not on Base Network
(13A) LRS INVENTORY ROUTE	(13B) LRS SUBRTE #	
(11) LRS MILE POINT		0.000 MI
(105) FEDERAL LANDS HIGHWAY		0 N/A (NBI)
(20) TOLL		3 On free road
(21) MAINTAINENANCE RESPONSIBILITY		County Hwy Agency
(22) OWNER		County Hwy Agency
(37) HISTORICAL SIGNIFICANCE		5 Not eligible for NRHP
(101) PARALLEL STRUCTURE		No || bridge exists
(103) TEMPORARY STRUCTURE		Unknown (NBI)

AGE AND SERVICE

(29) AVERAGE DAILY TRAFFIC	480
(109) AVERAGE DAILY TRUCK TRAFFIC	0 %
(30) YEAR OF ADT	2014
(27) YEAR BUILT	1955
(106) YEAR REHABILITATED	
(102) ONE WAY OR TWO WAY TRAFFIC	2 2-way traffic
(42A) SERVICE ON THE BRIDGE	1 Highway
(42B) SERVICE UNDER THE BRIDGE	5 Waterway
(28A) LANES ON ROUTE	2
(28B) LANES UNDER ROUTE	0
(19) BYPASS DETOUR LENGTH	6.2 MI

POSTING

(41) POSTING STATUS					P Posted for load
JUSTIFICATION					Posting Required
TYPE					R12-1
STATUS					Posting signs in place
R12-1				Grs Wt:	N/A
R12-5	Sgl Unit:	12	2-Unit: 20	3-Unit:	34
EMERGENCY VEH	Sgl Axle:	N/A	Tdm Axle: N/A	EV Gross Wt:	N/A

LOAD RATING

(66) INVENTORY LOAD (tons) or RATING FACTOR (RF)	7.9 tons
(64) MAXIMUM LOAD (tons) or RATING FACTOR (RF)	13.0 tons
(31) DESIGN LOAD	2 M 13,5 (H 15)
(65) INVENTORY LOAD RATING METHOD	1 LF Load Factor (tons)
(63) OPERATING (MAX) LOAD RATING METHOD	1 LF Load Factor (tons)
(70) POSTING REQUIREMENTS	0 >39.9% below

SCHEDULE

(90) ROUTINE INSPECTION DATE				07/01/2019
(91) ROUTINE INSPECTION FREQUENCY				24 MO
(92) CRITICAL FEATURE INSPECTION:				(93) INSP DATE
A) FRACTURE CRITICAL	Y	24 MO	A)	06/04/2019
B) UNDERWATER INSP	Y	60 MO	B)	11/04/2019
C) SPECIAL INSP	Y	24 MO	C)	06/18/2019

GEOMETRIC DATA

(112) NBIS BRIDGE DEFINITION	Long Enough
(49) STRUCTURE LENGTH	2,113.0 FT
(48) MAXIMUM SPAN LENGTH	240,2 FT
(32) ROUTE WIDTH	25.9 FT
(51) BRIDGE ROADWAY WIDTH, CURB TO CURB	22.0 FT
(52) DECK WIDTH OUT TO OUT	25,6 FT
(50A) LEFT CURB OR SIDEWALK WIDTH	0.0 FT
(50B) RIGHT CURB OR SIDEWALK WIDTH	0.0 FT
(34) SKEW	0.0 °
(47) ROUTE HORIZONTAL CLEARANCE	22,0 FT
(10) MIN VERT CLEARANCE OVER ROUTE	99,99 FT
(53) MIN VERT CLEARANCE OVER BRIDGE	99.99 FT
(33) MEDIAN	0 No median
(35) STRUCTURE FLARED	0 No flare
(54A) MIN VERT UNDERCLEARANCE REF	N Feature not hwy or RR
(54B) MIN VERT UNDERCLEARANCE	0,00 FT
(55A) MIN LATERAL UNDERCLEAR REF RT	N Feature not hwy or RR
(55B) MIN LATERAL UNDERCLEAR RT	0.0 FT
(56) MIN LATERAL UNDERCLEARANCE LEFT	0.0 FT

STRUCTURE AND MATERIALS

(45) NUMBER OF MAIN SPANS	9
(43B) MAIN SPAN DESIGN TYPE	03-Girder-Floorbeam
(43A) MAIN SPAN MATERIAL TYPE	4 Steel Continuous
KDOT MAIN SPAN MATERIAL TYPE:	4 - 03 : None/UNK/NU
(107) DECK TYPE	1 Concrete-Cast-in-Place
(108A) DECK SURFACE	0 None
(108B) MEMBRANE	0 None
(108C) DECK PROTECTION	None
(46) NUMBER OF APPROACH SPANS	3
(44B) APPROACH SPAN DESIGN TYPE	
(44A) APPROACH SPAN MATERIAL TYPE	3 Steel
KDOT APPROACH SPAN MATERIAL TYPE:	

CONDITION

(58) DECK CONDITION RATING	4
(59) SUPERSTRUCTURE CONDITION	6
(60) SUBSTRUCTURE CONDITION	6
(62) CULVERT CONDITION	N
(61) STREAM STABILITY / CHANNEL	6
NBI BRIDGE CONDITION (G/F/P)	Poor

APPRAISAL

DEFICIENCY STATUS	Structurally Deficient
(72) BRIDGE ROUTE ALIGNMENT	8
(71) WATERWAY ADEQUACY	8
(113) SCOUR VULNERABILITY	4
(67) STRUCTURAL EVALUATION	3
(68) DECK WIDTH APPRAISAL	4
(69) HORIZ. UNDERCLEARANCE APPRAISAL	N
SUFFICIENCY RATING	33,90
(36A) BRIDGE RAILS	0
(36B) RAIL TRANSITIONS	0
(36C) APPROACH GUARDRAILS	0
(36D) APPROACH GUARDRAIL ENDS	0

NAVIGATION DATA

(38) NAVIGABLE WATERWAY	Permit Not Required
(39) NAVIGATION VERTICAL CLEARANCE	FT
(40) NAVIGATION HORIZONTAL CLEARANCE	FT
(111) SUBSTRUCTURE NAV PROTECTION	Unknown (NBI)
(116) MIN NAV VERT CLEAR VERT LIFT BRIDGE	FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK	Not Applicable (P)
(75B) WORK BY	Unknown (NBI)
(76) IMPROVEMENT LENGTH	FT
(94) BRIDGE COST	
(95) ROADWAY COST	
(96) TOTAL COST	
(97) COST ESTIMATE YEAR	
(114) FUTURE ADT	500
(115) FUTURE ADT YEAR	2039

Printed: 1/3/2020 RECORD DATE: 07/10/2019 INSPKEY: UONB KDOT BLP SIA Single WN v9,0 rev,5

Available from KART (**http://kart.ksdot.org/**)

Structure Inventory & Appraisal (English)

(8) STRUCTURE NO	000000000750320	(1) STATE	20 Kansas	(4) CITY Rural	(3) COUNTY Pottawatomie
LPA Bridge ID	320	LPA Bridge Name		_	(5A) ROUTE ON/UNDER Route On Structure
					HBP FUNDING ELIGIBILITY Replacement

NOTES

STRUCTURE NOTES

LOCHNER 12/02/2013- No significant indications were found on the pins this inspection. Continue ultrasonic inspection on 24 month frequency.

24 month frequency Statewide PH Inspection. BLP_MAI_04/2013.

Lochner 12-1-11 - No repairs are required on the pin and hanger joints on this bridge at this time. Continue ultrasonic inspection on the recommended two year frequency.

5-28-2013 168'-216'-5 @ 240'-216'-168' SSGS, and 44'-2 @ 45' SBMS, bridge posted 12-20-34 tons, 4 OM-3's, deck has a chip seal, raveled along edges and patched areas, some spalls and popouts, rough riding, areas sound hollow, hairline cracks with efflorescence underside overhang , moderate rust and flaking at expansion joints and girder system ends, moderate abrasion and spalls to piers 8 & 9 west sides, drift at pier 5, rock protection north berm, erosion on south berm, river W to E, moderate bank erosion, vegetation & timber, UGFO east, phone and other utilities on bridge.

INSPECTION NOTES

Deck: Deck in very poor condition. Popouts, patches and deterioration throughout. Exposed rebar. Cracking on under side of deck.

Superstructure: Heavy rust on steel beams and girders. Heavy rust at expansion joint locations.

Substructure: Concrete piers and abutments in fair condition.

Waterway: Large drift pile, Erosion south berm, High swift flood waters at time of inspection.

Bridge Notes: Replace deck. remove drift.

Misc.: 4 OM 3's. Posted 9/13/23.

ROADWAY NOTES

_

POSTING NOTES

Printed: 1/3/2020 RECORD DATE: 07/10/2019 INSPKEY: UONB KDOT BLP SIA Single WN v9,0 rev,5

SAMPLE LOCAL PROJECTS BRIDGE INSPECTION FORM (LPBIF)

Kansas Local Bridge Inspection Form

(8) STRUCTURE NO	000000000750320	**(1) STATE**	20 Kansas	**(4) CITY** Rural	**(3) COUNTY** Pottawatomie
LPA Bridge ID	320	**(5A) ROUTE ON/UNDER**	Route On Structure	**HBP FUNDING ELIGIBILITY**	Replacement

IDENTIFICATION

(5B) ROUTE TYPE		4 County Hwy
(5C) SERVICE TYPE		1 Mainline
(5D) ROUTE NUMBER	01070	**(5E) SUFFIX** 0 N/A
(6A) FEATURE INTERSECTED		KANSAS RIVER
(9) LOCATION		1.5S 1.5E OF BELVUE
(16) LATITUDE		39 ° 11 ' 27.69 "
(17) LONGITUDE		96 ° 08 ' 50.96 "
(2) HIGHWAY AGENCY DISTRICT		Topeka
(98A) BORDER BRIDGE STATE		Not Applicable
(98B) BORDER BRIDGE RESPONSIBILITY		
(99) BORDER BRIDGE STRUCTURE NO.		
(7) (ROUTE NAME) FACILITY CARRIED		SCHOEMAN ROAD

FUNCTIONAL

(26) FUNCTIONAL CLASSIFICATION	07 Rural Mjr Collector
(104) NHS DESIGNATION	0 Not on NHS
(100) STRAHNET DESIGNATION	0 Not a STRAHNET Hwy
(110) NATIONAL TRUCK NET	0 Not part of natl network
(12) BASE HIGHWAY NET	Not on Base Network
(13A) LRS INVENTORY ROUTE	**(13B) LRS SUBRTE #**
(11) LRS MILE POINT	0.000
(105) FEDERAL LANDS HIGHWAY	0 N/A
(20) TOLL	3 Rdwy Agreement
(21) MAINTENANCE RESPONSIBILITY	County Hwy Agency
(22) OWNER	County Hwy Agency
(37) HISTORICAL SIGNIFICANCE	Not eligible for NRHP
(101) PARALLEL STRUCTURE	No || bridge exists
(103) TEMPORARY STRUCTURE	_

AGE

(29) AVERAGE DAILY TRAFFIC	480
(109) AVERAGE DAILY TRUCK TRAFFIC	0
(30) YEAR OF ADT	2014
(27) YEAR BUILT	1955
(106) YEAR REHABILITATED	
(102) ONE WAY OR TWO WAY TRAFFIC	2-way traffic
(42A) SERVICE ON THE BRIDGE	1 Highway
(42B) SERVICE UNDER THE BRIDGE	5 Waterway
(28A) LANES ON ROUTE	2
(28B) LANES UNDER ROUTE	0
(19) BYPASS DETOUR LENGTH	6.2 MI

POSTINGS

(41) POSTING STATUS							P Posted for load
JUSTIFICATION							N/A
POSTING TYPE							N/A
POSTING STATUS							N/A
R12-1					Grs Wt	N/A	
R12-5	Sgl Unit	N/A	2-unit	N/A	3-unit	N/A	
EMERGENCY VEHICLES	Sgl Axle	N/A	Tdm Axle	N/A	Grs Wt	N/A	

RATING

(66) INVENTORY LOAD RATING	8 ton
(64) MAXIMUM LOAD RATING	13 ton
(31) DESIGN LOAD	2 M 13.5 (H 15)
(65) INVENTORY LOAD RATING METHOD	1 LF Load Factor
(63) OPERATING (MAX) LOAD RATING METHOD	1 LF Load Factor
(70) POSTING REQUIREMENTS	0 > 39.9% below
(41) POSTING STATUS	P Posted for load

SCHEDULE

(90) ROUTINEINSPECTION DATE			07/01/2019	
(91) ROUTINE INSPECTION FREQUENCY			24 MO	
(92) CRITICAL FEATURE INSPECTION:			**(93) INSP DATE**	
A) FRACTURE CRITICAL	Y	24 MO	**A)** 06/04/2019	
B) UNDERWATER INSP	Y	60 MO	**B)** 11/12/2013	
C) SPECIAL INSP	Y	24 MO	**C)** 09/14/2015	

Printed: 1/3/2020 **INSPKEY: YLRS** *LBIS 9.0-KDOT BLP Inspection Form (Batch)-v. 9.0.0* *01/03/2020 14:37*

Kansas Local Bridge Inspection Form

(8) STRUCTURE NO	000000000750320	**(1) STATE**	20 Kansas	**(4) CITY**	Rural
LPA Bridge ID	320	**(5A) ROUTE ON/UNDER**	Route On Structure	**(3) COUNTY**	Pottawatomie
				HBP FUNDING ELIGIBILITY	Replacement

PROPOSED IMPROVEMENTS	
(75A) TYPE OF WORK	Not Applicable
(75B) WORK BY	
(76) IMPROVEMENT LENGTH	
(94) BRIDGE COST	
(95) ROADWAY COST	
(96) TOTAL COST	
(97) COST ESTIMATE YEAR	
(114) FUTURE ADT	500
(115) FUTURE ADT YEAR	2039

GEOMETRIC DATA	
(112) NBIS BRIDGE DEFINITION	Long Enough
(49) STRUCTURE LENGTH	2,113.0 FT
(48) MAXIMUM SPAN LENGTH	240.2 FT
(32) ROUTE WIDTH	25.9 FT
(51) BRIDGE ROADWAY WIDTH, CURB TO CURB	22.0 FT
(52) DECK WIDTH OUT TO OUT	25.6 FT
(50A) LEFT CURB OR SIDEWAY WIDTH	0.0 FT
(50B) RIGHT CURB OR SIDEWAY WIDTH	0.0 FT
(34) SKEW	
(47) ROUTE HORIZONTAL CLEARANCE	22.00 FT
(10) MIN VERT CLEARANCE OVER ROUTE	99.99 FT
(53) MIN VERT CLEARANCE OVER BRIDGE	99.99 FT
(33) MEDIAN	No Median
(35) STRUCTURE FLARED	No flare
(54A) MIN VERT UNDERCLEARANCE REF	Feature not hwy or RR
(54B) MIN VERT UNDERCLEARANCE	0.00 FT
(55A) MIN LATERAL UNDERCLEAR REF RT	Feature not hwy or RR
(55B) MIN LATERAL UNDERCLEAR RT	0.0 FT
(56) MIN LATERAL UNDERCLEARANCE LEFT	0.0 FT

STRUCTURE TYPE	
(45) NUMBER OF MAIN SPANS	9
(43B) MAIN SPAN DESIGN TYPE	Girder-Floorbeam
(43A) MAIN SPAN MATERIAL TYPE	Steel Continuous
KDOT Type Code - Main: 1001	None/UNK/NULL
(46) NUMBER OF APPROACH SPANS	3
(44B) APPROACH SPAN DESIGN TYPE	
(44A) APPROACH SPAN MATERIAL TYPE	Steel
KDOT Type Code - Appr: -1	None/UNK/NULL
(107) DECK TYPE	Concrete-Cast-in-Place
(108A) DECK SURFACE	0 None
(108B) MEMBRANE	0 None
(108C) DECK PROTECTION	0 None

CONDITION	
(58) DECK CONDITION RATING	4
(59) SUPERSTRUCTURE CONDITION	6
(60) SUBSTRUCTURE CONDITION	6
(62) CULVERT CONDITION	N
(61) STREAM STABILITY / CHANNEL	6

APPRAISAL	
(72) BRIDGE ROUTE ALIGNMENT	8
(71) WATERWAY ADEQUACY	8
(36A) BRIDGE RAILS	0
(36B) RAIL TRANSITIONS	0
(36C) APPROACH GUARDRAILS	0
(36D) APPROACH GUARDRAIL ENDS	0
(113) SCOUR VULNERABILITY	4
(67) STRUCTURAL EVALUATION	3
(68) DECK WIDTH APPRAISAL	4
(69) HORIZ. UNDERCLEARANCE APPRAISAL	N
SUFFICIENCY RATING	33.90
DEFICIENCY STATUS	Structurally Deficient

Printed: 1/3/2020 **INSPKEY: YLRS** *LBIS 9.0-KDOT BLP Inspection Form (Batch)-v. 9.0.0* *01/03/2020 14:37*

Kansas Local Bridge Inspection Form

(8) STRUCTURE NO	000000000750320	**(1) STATE**	20 Kansas	**(4) CITY**	Rural
LPA Bridge ID	320	**(5A) ROUTE ON/UNDER**	Route On Structure	**(3) COUNTY**	Pottawatomie
				HBP FUNDING ELIGIBILITY	Replacement

NOTES

Deck:

Superstructure:

Substructure:

Waterway:

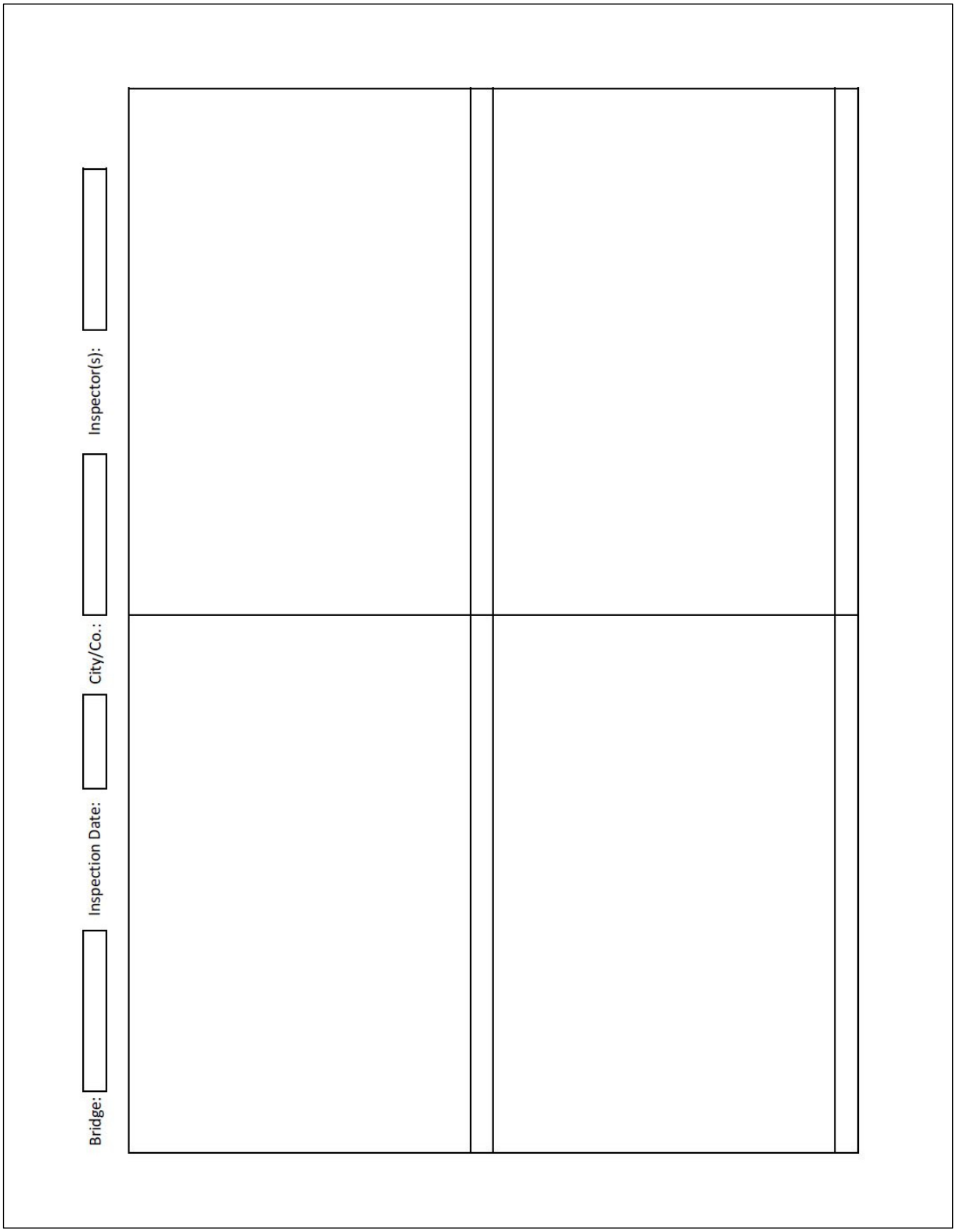
Culvert:

Misc:

Print Name Inspusrkey: 5855 Team Leader's Signature Date

Printed: 1/3/2020 **INSPKEY: YLRS** *LBIS 9.0-KDOT BLP Inspection Form (Batch)-v. 9.0.0* *01/03/2020 14:37*

SAMPLE BRIDGE INSPECTION PHOTOGRAPH TEMPLATE



Available from KART (**http://kart.ksdot.org/**)

SAMPLE ROUTINE BRIDGE INSPECTION SUBMITTAL FORM

Routine Bridge Inspection Submittal

County/City _____

This form shall be completed for each bridge owner and submitted to KDOT Bureau of Local Projects when Routine or Inventory bridge Inspections are performed.

Date Range Inspection(s) Performed: Start Date _____ End Date _____

Routine Inspection Team Leader(s): _____ _____

_____ _____ _____

_____ _____ _____

The Professional Engineer certifies the following tasks were completed:

- Office Review Performed
  (*Checked Inspection(s) for completeness and accuracy)*
- Scour Vulnerability Reviewed
  (*Scour code from Item 113 Justification Form(s) match the Bridge Inspection Portal)*
- Scour POAs Reviewed and Updated (as required)
  (*POA form(s) in bridge file are updated with name, date updated, and noteworthy items)*
- Load Ratings Reviewed
  (*Load Rating Summary Sheet(s) are sealed/signed and in the official bridge file)*
  (Reviewed for completeness, required information and current bridge condition(s))
  Note - Bridges built prior to 2016 will receive a load rating by the Kansas Local Bridge Rating Program.
- Error-free Data Validation(s) Performed in the Bridge Inspection Portal *
- Bridge Inspection Portal Calculated Values Accepted *
  (Item 67, 68, 69 and Sufficiency Rating results accepted in the Bridge Inspection Portal)

* Please attach both generated reports for Data Validation(s) and Sufficiency Rating(s) to this submittal.

The Professional Engineer, licensed in Kansas, in charge of the inspection group shall seal and sign below, certifying the above documents have been reviewed and match the official bridge record(s).

(Seal & Signature)

Available from KART (**http://kart.ksdot.org/**)

SAMPLE WEB PORTAL VALIDATION REPORT FORM (with errors or warnings)

Kansas Department of Transportation **Bureau of Local Projects**

LOCAL BRIDGE INSPECTION SYSTEM

BRIDGE DATA VALIDATION EXCEPTIONS

Jewell CYG

Bridge ID	On/Under	Check #	Severity	Exception ID	Exception Description
00450715003509			OK		Bridge generated no validation errors.
00450715103220			OK		Bridge generated no validation errors.
00450715103320			OK		Bridge generated no validation errors.
00450715903360			OK		Bridge generated no validation errors.
00450715903500			OK		Bridge generated no validation errors.
00450717003347			OK		Bridge generated no validation errors.
00450717003380			OK		Bridge generated no validation errors.
00450717003585			OK		Bridge generated no validation errors.
00450717203463			OK		Bridge generated no validation errors.
00450717303380			OK		Bridge generated no validation errors.
00450717503120			OK		Bridge generated no validation errors.
00450717603160			OK		Bridge generated no validation errors.
00450717603380			OK		Bridge generated no validation errors.
00450717703080			OK		Bridge generated no validation errors.
00450717903320			OK		Bridge generated no validation errors.
00450719003086			OK		Bridge generated no validation errors.
00450719003126			OK		Bridge generated no validation errors.
00450719003163	1	82	W	IE070	THE BRIDGE POSTING EVALUATION CODE IS NOT VALID
	1	170	W	CE031	ITEM 41 = E OR K - SO ITEM 64 MUST BE = 0
	1	172	W	CE033	ITEM 41 = E OR K - SO ITEM 66 MUST BE = 0
00450719003309			OK		Bridge generated no validation errors.
00450719303100			OK		Bridge generated no validation errors.
00450719503120			OK		Bridge generated no validation errors.
00450721003129			OK		Bridge generated no validation errors.
00450721003168			OK		Bridge generated no validation errors.
00450721003203			OK		Bridge generated no validation errors.
00450721003222			OK		Bridge generated no validation errors.

Bridge Group: Jewell CYG Page 8

SAMPLE WEB PORTAL VALIDATION REPORT FORM (w/o errors or warnings)

Kansas Department of Transportation **Bureau of Local Projects**

LOCAL BRIDGE INSPECTION SYSTEM

BRIDGE DATA VALIDATION EXCEPTIONS

Stanton CYG

Bridge ID	On/Under	Check #	Severity	Exception ID	Exception Description
000000000940010			OK		Bridge generated no validation errors.
000000000940020			OK		Bridge generated no validation errors.
000000000940030			OK		Bridge generated no validation errors.
000000000940040			OK		Bridge generated no validation errors.
000000000940050			OK		Bridge generated no validation errors.
000000000940060			OK		Bridge generated no validation errors.
000000000940070			OK		Bridge generated no validation errors.
000000000940080			OK		Bridge generated no validation errors.
000000000940090			OK		Bridge generated no validation errors.
000000000940100			OK		Bridge generated no validation errors.
000000000940110			OK		Bridge generated no validation errors.
000000000940120			OK		Bridge generated no validation errors.
009403090063B9			OK		Bridge generated no validation errors.
009403090064D9			OK		Bridge generated no validation errors.
009403578066B0			OK		Bridge generated no validation errors.

15 bridges generated 0 exceptions

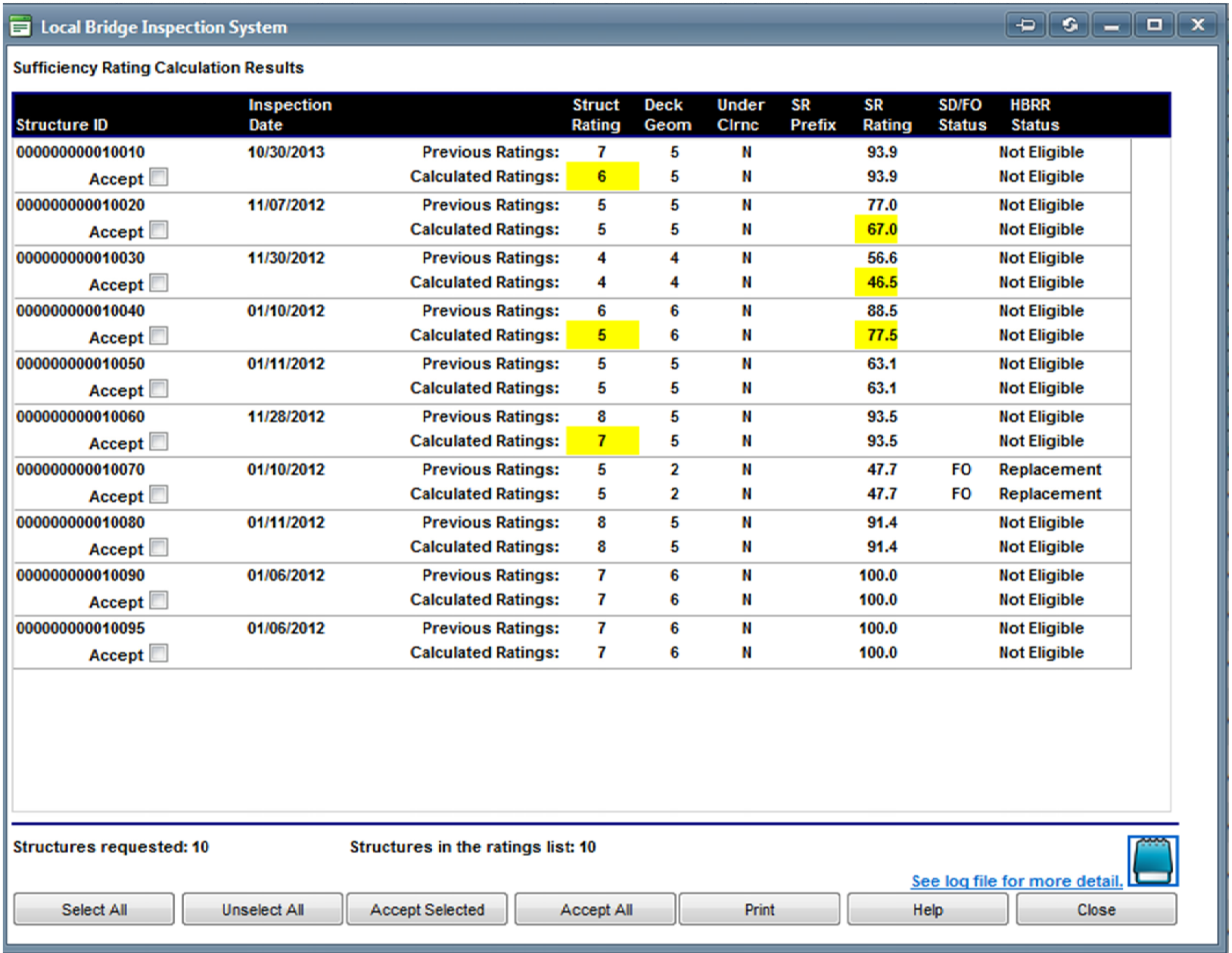
All Bridge Groups

15 bridges generated 0 exceptions

Printed 12/5/2011

Bridge Group: Stanton CYG

Page 1



Structure ID	Inspection Date		Struct Rating	Deck Geom	Under Clrnc	SR Prefix	SR Rating	SD/FO Status	HBRR Status
000000000010010	10/30/2013	Previous Ratings:	7	5	N		93.9		Not Eligible
Accept		Calculated Ratings:	6	5	N		93.9		Not Eligible
000000000010020	11/07/2012	Previous Ratings:	5	5	N		77.0		Not Eligible
Accept		Calculated Ratings:	5	5	N		67.0		Not Eligible
000000000010030	11/30/2012	Previous Ratings:	4	4	N		56.6		Not Eligible
Accept		Calculated Ratings:	4	4	N		46.5		Not Eligible
000000000010040	01/10/2012	Previous Ratings:	6	6	N		88.5		Not Eligible
Accept		Calculated Ratings:	5	6	N		77.5		Not Eligible
000000000010050	01/11/2012	Previous Ratings:	5	5	N		63.1		Not Eligible
Accept		Calculated Ratings:	5	5	N		63.1		Not Eligible
000000000010060	11/28/2012	Previous Ratings:	8	5	N		93.5		Not Eligible
Accept		Calculated Ratings:	7	5	N		93.5		Not Eligible
000000000010070	01/10/2012	Previous Ratings:	5	2	N		47.7	FO	Replacement
Accept		Calculated Ratings:	5	2	N		47.7	FO	Replacement
000000000010080	01/11/2012	Previous Ratings:	8	5	N		91.4		Not Eligible
Accept		Calculated Ratings:	8	5	N		91.4		Not Eligible
000000000010090	01/06/2012	Previous Ratings:	7	6	N		100.0		Not Eligible
Accept		Calculated Ratings:	7	6	N		100.0		Not Eligible
000000000010095	01/06/2012	Previous Ratings:	7	6	N		100.0		Not Eligible
Accept		Calculated Ratings:	7	6	N		100.0		Not Eligible

Local Bridge Inspection System
Sufficiency Rating Calculation Results
Structure ID
Inspection Date
Struct Rating
Deck Geom
Under Clrnc
SR Prefix
SR Rating
SD/FO Status
HBRR Status
00000000010010
10/30/2013
Previous Ratings: 6 5 N 93.9 Not Eligible
Calculated Ratings: 6 5 N 93.9 Not Eligible
Accept
00000000010020
11/07/2012
Previous Ratings: 5 5 N 67.0 Not Eligible
Calculated Ratings: 5 5 N 67.0 Not Eligible
Accept
00000000010030
11/30/2012
Previous Ratings: 4 4 N 46.5 Not Eligible
Calculated Ratings: 4 4 N 46.5 Not Eligible
Accept
00000000010040
01/10/2012
Previous Ratings: 5 6 N 77.5 Not Eligible
Calculated Ratings: 5 6 N 77.5 Not Eligible
Accept
00000000010050
01/11/2012
Previous Ratings: 5 5 N 63.1 Not Eligible
Calculated Ratings: 5 5 N 63.1 Not Eligible
Accept
00000000010060
11/28/2012
Previous Ratings: 7 5 N 93.5 Not Eligible
Calculated Ratings: 7 5 N 93.5 Not Eligible
Accept
00000000010070
01/10/2012
Previous Ratings: 5 2 N 47.7 FO Replacement
Calculated Ratings: 5 2 N 47.7 FO Replacement
Accept
00000000010080
01/11/2012
Previous Ratings: 8 5 N 91.4 Not Eligible
Calculated Ratings: 8 5 N 91.4 Not Eligible
Accept
00000000010090
01/06/2012
Previous Ratings: 7 6 N 100.0 Not Eligible
Calculated Ratings: 7 6 N 100.0 Not Eligible
Accept
00000000010095
01/06/2012
Previous Ratings: 7 6 N 100.0 Not Eligible
Calculated Ratings: 7 6 N 100.0 Not Eligible
Accept
Structures requested: 10
Structures in the ratings list: 10
See log file for more detail.
Select All
Unselect All
Accept Selected
Accept All
Print
Help
Close

Appendix

B

LOCAL FRACTURE CRITICAL MEMBER INSPECTION SCOPE OF SERVICES AND FORMS

TABLE OF CONTENTS

Disclaimer: Bridge inspections in compliance with KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined bridge inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.* This listing is provided to assist Owners in performing or contracting to have performed bridge inspection services that meet applicable bridge inspection requirements. These terms are not intended or represented by KDOT to constitute a contract or substitute as a professionally drafted contractual agreement. Owners should consult with legal counsel to obtain an appropriate contractual agreement including this scope of services when contracting with a bridge inspection consultant to meet their obligations under 23 C.F.R. § 650 *et seq.*

Scope of Services for Local Fracture Critical Member Inspections[1]

General

1. Fracture Critical Member (FCM) Inspections shall be conducted in accordance with federal regulations and references listed in Attachment A.

2. Where applicable, all National Bridge Inventory (NBI) data items and condition states shall be verified during the inspection and updated. This may require coordination with the City/County ("Owner") on items not observable.

3. City/County bridge inspections are subject to review by the Kansas Department of Transportation (KDOT). If errors or discrepancies are found, the Consultant, at no additional cost (or Owner if the inspection is performed by the Owner), shall be required to make corrections. The KDOT Bureau of Local Projects (BLP) will oversee Quality Control/Quality Assurance (QC/QA) evaluations of bridge records and inspections. Substandard work is grounds for removal from the Kansas Local Bridge Inspection Team Leader list.

Number of Bridges for Inspection

4. The Owner has ____ bridges with Fracture Critical Members to be inspected.

Specific Requirements for Inspections

5. A Bridge Inspection Team Leader qualified as a Fracture Critical Member Inspection Team Leader on the Kansas Local Bridge Inspection Team Leader list maintained by KDOT BLP must be present for the duration of all FCM Inspections.

6. The standard KDOT BLP Fracture Critical Member Inspection Form shall be used to record the field inspection data.

7. Critical Inspection Findings shall be reported (by telephone or in person) to the Owner immediately. Critical Inspection Findings shall be recorded on the standard KDOT BLP Critical Inspection Findings form. All Critical Inspection Findings shall be in accordance

[1] Bridge inspections conducted under KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined that inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.*

with the Critical Inspection Finding section in Chapter 1 - Bridge Inspection Policies of the BLP Bridge Inspection Manual.

8. During the Fracture Critical Member Inspection, any weight limit signs found missing, knocked down, damaged to the point of not being legible, or obscured by vegetation; shall be reported the same day to the Owner (by phone or in person). Signs with limits exceeding the maximum allowable loads according to the latest load ratings shall also be reported to the Owner.

9. Review routine and critical feature inspection frequencies for the inspected bridges to verify the proper inspection frequencies have been set and followed.

10. Review load ratings and Load Rating Summary Sheets for the inspected bridges and report if the information is in need of updating.

11. Review photographs in the bridge record and add any required photographs not in the bridge record for the inspected bridges. Provide new photographs of items as necessary to adequately document significant deficiencies, changed conditions, or repairs needed. Approach photographs should include the weight limit posting signs at each end of the bridge for all load posted bridges.

Work Required

12. The following activities are required for all Fracture Critical Member Inspections.

    A. A Fracture Critical Member Inspection shall be performed on all FCMs for each Fracture Critical bridge identified above.

    B. All FCMs shall be inspected within a distance equal to or less than 18 inches.

    C. At least one non-destructive testing (NDT) method including, but not limited to, dye penetrant, magnetic particle, eddy current, or ultrasound should be conducted on any suspected crack discovered during the Fracture Critical Member Inspection to aid in determining the presence and extent of cracks, discontinuities, deficient welds, or other irregularities.

    D. Any observed or appreciable active section loss on members normally analyzed to determine the safe load carrying capacity of the bridge shall be measured and documented sufficiently to allow for future analysis of the structure. Where active corrosion has reduced the section of an element or gusset plate, measurements shall be taken at the areas where the most section loss has occurred. Appreciable section loss shall be defined as a reduction of the member's section by ten percent (10%) or more. The documentation shall include a photograph of the area of section loss showing the outline of the corroded area and member name using the member naming convention found in Attachment B. All outlines shall be done in a permanent paint pen using a color that will be readily visible against the color of the member being marked. Where there has been no observed section loss, no measurements are required. Painted over areas of

section loss having been measured by previous inspections, need not be re-measured or shown if there are no indications of active corrosion.

E. All loose or missing rivets or bolts shall be noted in the Fracture Critical Member Inspection Report.

F. All steel pier caps (either box or I-section), including unusual connection details, shall be carefully inspected for cracks and poorly designed or fabricated details. For a box section, the Fracture Critical Member Inspection shall include inspection of both the interior and exterior of the box section. Removal and replacement of all access hatches are the responsibility of the inspector. When replacing the hatches, they shall be reinstalled to a similar condition as they were found in.

G. Gusset plates on steel trusses shall be inspected within a distance equal to or less than 18 inches. The inspection team shall also examine each gusset plate from the side or profile. If it appears any gusset plate or member is out of plane, measurements shall be taken using a straight edge to quantify the severity of out of plane deflections. Photographs of the out of plane deflections shall be included in the Fracture Critical Member Inspection Report.

H. The Fracture Critical Member Inspection Team Leader shall be responsible for identifying and noting all visible defects whether as a result of deterioration, original construction, or original design. They shall also be responsible for identifying and noting areas of potential failure as a result of deterioration or inadequate details. This shall include the removal of debris including, but not limited to, heavy rust, organic waste, paint or steel grit. The Fracture Critical Member Inspection Team Leader will not be responsible for identifying and noting structural conditions which occur after the date of their inspection, providing the condition was not visibly evident at the time of their inspection.

Deliverables

13. A Fracture Critical Member Inspection Report for each inspected bridge. Provide one individual bound copy of the Fracture Critical Member Inspection Report to the Owner for each contracted bridge to be filed with its applicable bridge record kept with the Owner and an electronic Portable Document Format (PDF) copy to KDOT via the KDOT BLP Bridge Inspection Portal. At a minimum, the report shall include the following:

    A. Inspection notes listing location and identifying all observed deficiencies, photographs of all applicable found or typical deficiencies, and recommendations.

    B. 11”x17” drawings showing plan and elevation views of the bridge and identifying FCMs and the locations of all photographs.

    C. Inspection procedures used, including access equipment.

    D. The type and results of NDT method(s) performed.

14. The inspection data shall be entered in the KDOT BLP Bridge Inspection Portal no later than 90 days following the Fracture Critical Member Inspection. All NBI Data Items in the existing database relevant to the Fracture Critical Member Inspection shall be checked while performing data entry and errors in the data shall be corrected.

15. The Fracture Critical Member Inspection Submittal form shall be sealed and signed by the Professional Engineer in charge of the inspection group and submitted along with the Data Validation and Sufficiency Rating Calculation forms to the KDOT BLP Bridge Team at **KDOT.BLPBridge@ks.gov** at the completion of the bridge inspection process.

ATTACHMENT A – STUDY PROCEDURES AND DESIGN CRITERIA

The procedures to be used in the field inspection of the bridges were derived from the following reference sources, current editions:

1. American Association of State Highway and Transportation Officials (AASHTO) The Manual for Bridge Evaluation

2. KDOT BLP Bridge Inspection Manual

3. Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges

4. Report No. FHWA-IP-86-26, Inspection of Fracture Critical Bridge Members

5. FHWA Bridge Inspector's Reference Manual

6. Manual on Uniform Traffic Control Devices

ATTACHMENT B – FRACTURE CRITICAL MEMBER NAMING CONVENTION

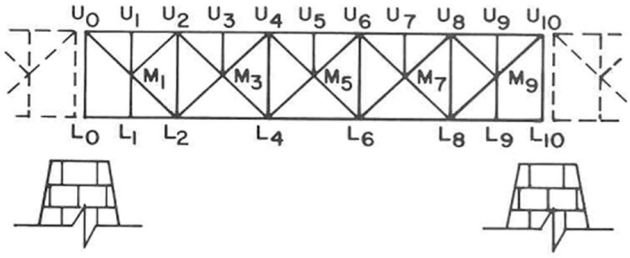
The naming convention shall follow the listed abbreviations below.

Bridge Member	**Example**
Arch=A	A1, A2
Truss=T	T1, T2
Span=SP	SP1-SP4
Unit=UN	UN1, UN2-UN3
Abutment=AB	AB 1, AB2
Pier=P	P1, P2, P3
Beam=B	B1 – B6
Diagonal=M	M3, M5
Girder=G	G1 - G2
Floorbeam=FB	FB1 – FB15
Stringer =S	S1 – S4
Upper=U	U2 - U5
Lower=L	L5 – L10
Vertical=V	V1, V5, V9
Portal=PT	PT1
Wind Bracing=WB	WB0-WB3
Bearing=BRG	BRG1, BRG2
Expansion Joint=JT	JT1, JT2
Cable=C	C1 - C6
Pin and Hanger=PH	PH1, PH2

Once the type of member is determined and the proper abbreviation is selected, members will be numbered in accordance with state stationing standards and follow cardinal directions from south to north or west to east.

Examples:

Member	**Designation**
West Arch	A1
East Truss	T2
South Portal	PT1
3rd Diagonal/E. Arch	A2/M3
South Unit/2nd Span from South/3rd Girder from West	U1/SP2/G3
West Truss/North Bearing	T1/BRG2
2nd Unit from South/South Span/4th Vert. from South	U2/SP1/V4



Available from KART (**http://kart.ksdot.org/**)

SAMPLE FRACTURE CRITICAL MEMBER INSPECTION FORM

IDENTIFICATION							
NBI BR.#	NBI #8	LOCAL #		CO. / CITY	NAME		
LOCATION	NBI #9	ROUTINE INSP. DATE	NBI #90	F/C INSP. DATE	NBI #92A		
LATITUDE	NBI #16	MAIN SP. MATERIAL	NBI #43A	F/C INTERVAL	# MO.		
LONGITUDE	NBI #17	MAIN SP. DESIGN	NBI #43B	# OF SPANS	NBI #45		
BR. DESCRIP./TYPE							

INSPECTION PERSONNEL			POSTINGS / LOAD RATING			
F/C TEAM LEADER	NAME		WEIGHT POSTINGS	#1	#2	#3
INSPECTOR	NAME		LOAD RATINGS?	Y/N	INV.	OPER.
INSPECTOR	NAME		NEW LOAD RATINGS?	Y/N	INV.	OPER.
INSPECTOR	NAME		LOAD RATING PE			DATE
MIN. VERT. CLR.	FT/IN	LOCATION	LOAD RATING FIRM			

NON-DESTRUCTIVE TESTING		METHOD OF INSPECTION ACCESS	
NDT TESTING PERFORMED	Y/N	TR. UPPER CHORDS	
EDDY CURRENT		TR. LOWER CHORDS	
MAGNETIC PARTICLE		FLOORBEAMS	
ULTRA-SOUND		STEEL PIER BEAM	
DYE PENETRANT		TWO GIRDER	
OTHER		OTHER	

BEARINGS TYPE / LOCATION			UTILTIES / TEMP.		
BEARING TYPE	QTY.	LOCATION	UTILITES ON BRIDGE?		Y/N
SLIDING PLATE			TYPE/SIZE	LOCATION	
ROLLER					
NESTED ROLLER					
ROCKER					
PIN/LINK					
ELASTOMERIC			AVG. BEARING CONDITION	RUSTED	CLEAN
POT				FREE	FROZEN
RESTRAINING				COVERED	OTHER
OTHER			AVG. TEMP. DURING INSP.		

JOINT CONDITION / POSITION			OTHER SPECIAL FEATURES	
JOINT TYPE	QTY.	LOCATION	SPECIAL FEATURES	NOTE
(FINGER, ELAST., ETC.)			BOLTED CONNECTION	
(FINGER, ELAST., ETC.)			RIVETED CONNECTION	
JOINT CONDITION			PINNED JOINT	
#1	RUSTED/FROZEN/FREE/DEBRIS/COVERED		PIN AND HANGER	
#2	RUSTED/FROZEN/FREE/DEBRIS/COVERED		FORGED EYEBARS	
#3	RUSTED/FROZEN/FREE/DEBRIS/COVERED		CAST EYEBARS	
JOINT POSITION			WELDED COVER PLATE	
#1	_____% OPEN/CLOSED/OTHER		INTERSECTING WELDS	
#2	_____% OPEN/CLOSED/OTHER		STEEL FATIGUE CRKS.	
#3	_____% OPEN/CLOSED/OTHER		CONSTRUCTION FLAW	

ANY OTHER APPLICABLE NOTES NOT COVERED BY ABOVE INFORMATION:

PAGE 1 OF

NBI BR.#		LOCAL #		CO. / CITY	
F/C TEAM LEADER		LAST ROUTINE INSP.		F/C/ INSP. DATE	
INSPECTOR		METHOD OF ACCESS (LADDER,			
INSPECTOR		(SNOOPER, PICK BOARD, ETC.)			

SPAN	TRUSS	MEMBER	INSPECTION FINDINGS, RESULTS, REMARKS, OR RECOMMENDATIONS	SKETCH/ PHOTO #

NBI BR.#		LOCAL #		CO. / CITY	
F/C TEAM LEADER		LAST ROUTINE INSP.		F/C/ INSP. DATE	
INSPECTOR		METHOD OF ACCESS (LADDER,			
INSPECTOR		(SNOOPER, PICK BOARD, ETC.)			

N

SKETCH/ PHOTO #

DESCRIPTION

N

SKETCH/ PHOTO #

SKETCH1

DESCRIPTION

N

SKETCH/ PHOTO #

DESCRIPTION

NBI BR.#		LOCAL #		CO. / CITY	
F/C TEAM LEADER		LAST ROUTINE INSP.		F/C/ INSP. DATE	
INSPECTOR		METHOD OF ACCESS (LADDER,			
INSPECTOR		(SNOOPER, PICK BOARD, ETC.)			

SKETCH2

NBI BR.#		LOCAL #		CO. / CITY	
F/C TEAM LEADER		LAST ROUTINE INSP.		F/C/ INSP. DATE	

DECK:

SUPERSTRUCTURE:

SUBSTRUCTURE:

WATERWAY:

SUMMARY

MISC:

RECOMMENDATIONS:

PAGE OF

Available from KART (**http://kart.ksdot.org/**). Use one COVER and SUMMARY per FCM inspection and any combination or quantity needed of the BODY or SKETCH sheets.

SAMPLE FRACTURE CRITICAL MEMBER INSPECTION SUBMITTAL FORM

Fracture Critical Member Inspection Submittal

County/City _____

This form shall be completed for each bridge owner and submitted to KDOT Bureau of Local Projects when Fracture Critical Member Inspections are performed.

Date Range Inspection(s) Performed: Start Date _____ End Date _____

Fracture Critical Member (FCM) Inspection Team Leader(s): _____

_____ _____ _____

_____ _____ _____

The Professional Engineer certifies the following tasks were completed:

- Office Review Performed
  (*Checked Inspection(s) for completeness and accuracy)*
- Load Ratings Reviewed
  (*Load Rating Summary Sheet(s) reviewed based on current FCM condition(s))*
- Error-free Data Validation(s) Performed in the Bridge Inspection Portal *
- Bridge Inspection Portal Calculated Values Accepted *
  (Item 67, 68, 69 and Sufficiency Rating results accepted in the Bridge Inspection Portal)

* Please attach both generated reports for Data Validation(s) and Sufficiency Rating(s) to this submittal.

The Professional Engineer, licensed in Kansas, in charge of the inspection group shall seal and sign below, certifying the above documents have been reviewed and match the official bridge record(s).

(Seal & Signature)

Available from KART (**http://kart.ksdot.org/**)

Appendix

C

LOCAL UNDERWATER INSPECTION SCOPE OF SERVICES

TABLE OF CONTENTS

Disclaimer: Bridge inspections in compliance with KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined bridge inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.* This listing is provided to assist Owners in performing or contracting to have performed bridge inspection services that meet applicable bridge inspection requirements. These terms are not intended or represented by KDOT to constitute a contract or substitute as a professionally drafted contractual agreement. Owners should consult with legal counsel to obtain an appropriate contractual agreement including this scope of services when contracting with a bridge inspection consultant to meet their obligations under 23 C.F.R. § 650 *et seq.*

Scope of Services for Local Underwater Inspections[1]

General

1. Underwater Inspections shall be conducted in accordance with federal regulations and references listed in Attachment A.

2. Where applicable, all National Bridge Inventory (NBI) data items and condition states shall be verified during the inspection and updated or corrected. This may require coordination with the City/County ("Owner") on AADT and similar items not observable.

3. The work performed under City/County bridge inspection contracts is subject to review by KDOT. If errors or discrepancies are found, the Consultant, at no additional cost (or Owner if the inspection is performed by the Owner), shall be required to make corrections. The KDOT Bureau of Local Projects (BLP) will oversee Quality Control / Quality Assurance (QC/QA) evaluations of bridge records and inspections.

Team Leader Requirements

4. Bridge Inspection Team Leaders must be qualified as an Underwater Inspection Team Leader on the Kansas Local Bridge Inspection Team Leader list maintained by KDOT BLP.

5. Substandard work is grounds for removal from the Kansas Local Bridge Inspection Team Leader list.

All Underwater Inspections should be consistent with the following:

Specific Requirements for Inspection

6. Inspection

   A. **Consultant** will perform Underwater Inspection of the ___ bridges listed in Attachment B. All Underwater Inspections will be completed in **Year**. **Consultant** will provide **Owner** and KDOT BLP with a minimum of 28 day notice prior to the commencement of inspection work.

   B. The members of the inspection team will be properly equipped and diving operations will be conducted in accordance with the Occupational Safety and Health Administration Commercial Diving Operations Standard (29 CFR 1910, Subpart T).

[1] Bridge inspections conducted under KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined that inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.*

C. The investigations will consist of a visual and tactile inspection of the exposed surfaces of the substructure elements from the waterline to the channel bottom with particular attention given to any observed areas of deterioration or apparent distress. Those substructure elements subjected to periodic submersion will also be given a full inspection. All structural elements to be inspected will be given a full Level I Inspection with a Level II Inspection of at least 10% of the substructure elements. Levels of inspection are defined by the Federal Highway Administration Report FHWA-DP-80-1 "Underwater Inspection of Bridges". Any observed areas of deterioration, section loss, or apparent distress will be noted, measured, and documented. The levels of inspection are defined below:

1) Level I Inspection - A visual survey of all structural components below the waterline. Where underwater vision is obscured to less than one foot, all portions of the structure shall be inspected by sweeping motions of the diver's hands.

2) Level II Inspection – Inspection of at least 10% of all underwater elements, as defined by FHWA standard levels and limits of underwater inspection with cleaning of the substructure surfaces as deemed necessary to accomplish the required inspection.

7. The following tasks shall be performed during the submerged substructure inspection process:

A. Piers

1) Inspect condition of concrete. Measure the size of spalls and delaminated areas and document locations. Locate and measure any areas of notable concrete deterioration. Note and document the location and size of cracks.

2) Inspect any exposed reinforcing steel and document remaining section adjacent to areas with section loss.

3) Inspect the toe of slope protection for scour and undermining. Measure area and give location of any voids.

B. Footings

1) Inspect for scour adjacent to footings, which could affect stability of the substructure. Measure and document size and location of scour.

2) Inspect for undermining of footings. Measure height and length of undermining cavity and the depth (extent) of scour from edge of footing to the point under footing where bearing is established. Note any exposed piling and record the limits of exposure.

3) Inspect condition of concrete. Measure locations and size of spalls, delaminated areas, and cracks. Inspect any exposed reinforcing steel and document remaining section adjacent to areas with section loss. Inspect condition of concrete where pile enters footing and record any voids or cracks.

C. Pile Bents

1) Inspect for scour at base of piling and record depth.

2) At least 10% of all underwater pile elements will be cleaned and thoroughly inspected (Level II). If a pile exhibits any section loss or deterioration, the extent and location of defects will be noted and documented.

3) Inspect any exposed reinforcing steel and document remaining section adjacent to areas with section loss.

8. Observations of the channel adjacent to the substructure elements will be made to determine the composition of the channel bottom material, the presence and extent of scour, the presence and extent of riprap or other scour countermeasure material, and the presence or extent of drift and debris. The inspection team will make general observations of the waterway and note any signs of waterway misalignment, excessive debris obstructing the channel flow, embankment scour, and failed or unstable embankment erosion control measures. Water depth soundings will be taken along both fascias of the bridge and upstream and downstream of the bridge at lines equal to approximately 100 feet from the centerline of the bridge (or at an appropriate distance as determined by the Underwater Inspection Team Leader). Soundings will also be taken around the submerged substructure elements and the waterline will be referenced to a known elevation (if elevation information is available) on the bridge.

9. Color photographs will be taken as necessary to document general conditions and observed deficiencies. The photographs will include, at a minimum, overall views of the bridge from upstream and downstream, a view of each substructure element located in the waterway, and any areas of noted deficiencies as deemed necessary by the inspection team leader.

10. Underwater acoustic imaging will be performed at bridge substructure elements in over 10 feet of water, where accessible, and will be performed at other substructure elements where the images would be beneficial to the inspection and report based on the judgment of the Underwater Inspection Team Leader. The underwater images will be rendered with the above water photograph for a comprehensive view of the substructure unit and incorporated into the report.

11. A visual inspection will also be performed of the underside of the bridge for the bridge spans located directly above the waterway. The observations will be made from the water level to detect any significant concrete and steel superstructure deficiencies. The defects will be estimated and summarized within the Underwater Inspection Report.

Deliverables

12. **Consultant** will prepare an individual report for each bridge. The report will include the inspection procedures, a summary of existing conditions, evaluation, and recommendations. In addition, the report will contain figures that will include a channel depth sounding plan, channel cross-sections along the upstream and downstream fascias of the bridge, and an individual figure for each submerged substructure unit with plan and elevation views and detailed inspection notes. The report will also contain coding information for NBI Items 60, 61, and 113 (based on field assessment). Color photographs taken during the inspection will be included in the report to illustrate general condition of the structure along with any deficiencies. The report shall be sealed and signed by a Professional Engineer licensed in Kansas.

13. **Consultant** will submit a hard copy of each inspection report and a digital copy of the all inspection reports in PDF format to **Owner** and KDOT BLP.

14. The inspection data shall be entered in the KDOT BLP Bridge Inspection Portal no later than 90 days following the bridge inspection. All applicable NBI Data Items in the existing database shall to be checked while performing data entry and errors in the data shall be corrected.

15. Required reports and assembly of updates to the Owner's bridge folder shall be completed within 90 days of the completion of the field inspection.

Items Required to Initiate Underwater Inspection Services

16. Following is a list of items required by **Consultant** , to begin work on the project:

    A. Design or As-Built plans for all bridges to be inspected (if available)

    B. Any recent design, repair, or as-built plans indicating any recent changes to any of the structures to be inspected (when available)

    C. Any Previous Inspection Reports

    D. Notice-to-Proceed for above proposed services

ATTACHMENT A - STUDY PROCEDURES AND DESIGN CRITERIA

The procedures followed in the field inspection of the bridges and the criteria utilized in the subsequent structural analyses and weight limit ratings, where performed, were derived from the following reference sources, current editions:

1. American Association of State Highway and Transportation Officials (AASHTO) The Manual for Bridge Evaluation

2. KDOT BLP Bridge Inspection Manual

3. Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges

4. Report No. FHWA-DP-80-1, Underwater Inspection of Bridges

5. FHWA Bridge Inspector's Reference Manual

6. Occupational Safety and Health Administration Commercial Diving Operations Standard (29 CFR 1910, Subpart T)

7. Manual on Uniform Traffic Control Devices

ATTACHMENT B – LIST OF UNDERWATER BRIDGE INSPECTIONS FOR **LPA OWNER**

NBI #	LPA #	Location	U/W Insp. Frequency	Type U/W Insp.

Appendix

D

LOCAL PIN AND HANGER INSPECTION SCOPE OF SERVICES

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Disclaimer: Bridge inspections in compliance with KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined bridge inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.* This listing is provided to assist Owners in performing or contracting to have performed bridge inspection services that meet applicable bridge inspection requirements. These terms are not intended or represented by KDOT to constitute a contract or substitute as a professionally drafted contractual agreement. Owners should consult with legal counsel to obtain an appropriate contractual agreement including this scope of services when contracting with a bridge inspection consultant to meet their obligations under 23 C.F.R. § 650 *et seq.*

Scope of Services for Local Pin and Hanger Inspections[1]

General

1. Pin and Hanger Inspections shall be conducted in accordance with federal regulations and references listed in Attachment A.

2. Where applicable, all National Bridge Inventory (NBI) data items and condition states shall be verified during the inspection and updated or corrected. This may require coordination with the City/County ("Owner") on AADT and similar items not observable.

3. The work performed under City/County bridge inspection contracts is subject to review by KDOT. If errors or discrepancies are found, the Consultant, at no additional cost (or Owner if the inspection is performed by the Owner), shall be required to make corrections. The KDOT Bureau of Local Projects (BLP) will oversee Quality Control / Quality Assurance (QC/QA) evaluations of bridge records and inspections.

Team Leader Requirements

4. Bridge Inspection Team Leaders must be qualified as a Pin and Hanger Inspection Team Leader on the Kansas Local Bridge Inspection Team Leader list maintained by KDOT BLP.

5. Substandard work is grounds for removal from the Kansas Local Bridge Inspection Team Leader list.

All Pin and Hanger Inspections should be consistent with the following:

Specific Requirements for Inspections

6. Preparation

   A. **Consultant** will perform the following:

      1. Review bridge plans, inspection records, and other available data provided by the Owner or KDOT BLP as specified in **Items Required to Initiate Pin and Hanger Inspection Services**.

      2. Prioritize and sequence the bridges for inspection, establish an inspection schedule and submit the schedule to the Owner and KDOT BLP for approval.

[1] Bridge inspections conducted under KDOT's Bridge Inspection Program shall be conducted by a qualified consultant under contract with the City/County ("Owner") or by qualified personnel employed by the Owner. KDOT has determined that inspections must cover the scope of services set forth below to comply with 23 C.F.R. § 650 *et seq.*

3. Revise or refine inspection forms, if appropriate, to uniformly record and report the structure inspected, date of inspection, pin location and pin and hanger strap conditions. Submit these forms to the KDOT BLP for review and approval.

4. Develop a detailed field inspection procedure consistent with **Inspection** and submit it to the Owner and KDOT BLP for approval.

5. Coordinate the lease or purchase of equipment necessary to perform the inspections. This equipment may include, but is not limited to, ultrasonic testing equipment, a bridge access apparatus, a supply truck, and traffic control devices.

6. Coordinate with the Owners for the various structures at least 14 calendar days prior to the inspection of the respective structures.

7. Inspection

A. **Consultant** will perform Pin and Hanger Inspection of the ___ bridges listed in Attachment B using procedures described as follows:

1. Implement traffic control measures in accordance to the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) as approved by the American Association of State Highway and Transportation Officials (AASHTO), the KDOT and the Federal Highway Association (FHWA).

2. With the calibration block, verify the calibration settings on the ultrasonic testing device, for all probes to be used for each structure.

3. Remove paint, rust and scale from the end of the pin. Adjust the screen of the ultrasonic testing machine for the appropriate length of the pin. Use appropriate ultrasonic inspection techniques to inspect the pin and determine if defects are present.

4. Pins shall be checked from each end.

5. For each pin inspection, a written record shall be made indicating the date and condition of the pin.

6. Upon completion of the inspection, the ends of the pins shall be painted to protect from rusting and serve as an indicator the pin has been inspected. The color of the paint shall indicate the year of the inspection. A penetrating lubricant shall also be applied to the pin in the area between the hanger straps and the girder web.

7. Terminate traffic control measures.

B. **Consultant** will keep the Owner and KDOT BLP informed regularly as to the status of the inspection schedule and any anticipated changes and notify the Owner and KDOT BLP **immediately** of any critical inspection findings discovered.

Deliverables

8. **Consultant** will organize and prioritize results of the field inspections upon completion to the following:

A. Submit one (1) copy of the initial draft of the report to the Owner and KDOT BLP.

B. Revise the report in accordance with the Owner's and KDOT BLP's comments.

C. Assemble separate single bound reports in accordance with the Owner's and KDOT BLP comments in PDF format for each bridge inspected which summarizes the overall results, recommendations, and locations where immediate repairs are required and includes a copy of the individual inspection report on structures under the authority of the Owner, submitting one (1) copy of each report to both the Owner and KDOT BLP. Each report shall be sealed and signed by a Professional Engineer licensed in Kansas.

D. Summarize the findings of the inspections in a PDF format Executive Summary Report addressing general and specific recommendations of the bridges. Within the single bound document will be copies of the individual inspection reports of the bridges inspected.

E. The report will also contain coding information for NBI Item 59 (based on field assessment). Color photographs taken during the inspection will be included in the report to illustrate general condition of the bridge along with any deficiencies.

F. The inspection data shall be entered in the KDOT BLP Bridge Inspection Portal no later than 90 days following the bridge inspection. All applicable NBI data items in the existing database shall be checked while performing data entry and errors in the data shall be corrected.

G. Required reports and assembly of updates to the Owner's bridge record shall be completed within 90 days of the completion of the field inspection.

Items Required to Initiate Pin and Hanger Inspection Services

9. Following is a list of items required by **Consultant** to begin work on the project:

A. Design or As-Built plans for all bridges to be inspected (if available)

B. Any recent design, repair, or as-built plans indicating any recent changes to any of the structures to be inspected (when available)

C. Any previous inspection reports

D. Notice-to-Proceed for above proposed services

ATTACHMENT A - STUDY PROCEDURES AND DESIGN CRITERIA

The procedures followed in the field inspection of the bridges were derived from the following reference sources, current editions:

1. American Association of State Highway and Transportation Officials (AASHTO) The Manual for Bridge Evaluation

2. KDOT BLP Bridge Inspection Manual

3. Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges

4. Report No. FHWA-IP-86-26, Inspection of Fracture Critical Bridge Members

5. FHWA Bridge Inspector's Reference Manual

6. Manual on Uniform Traffic Control Devices

ATTACHMENT B – LIST OF PIN AND HANGER BRIDGE INSPECTIONS FOR **LPA OWNER**

NBI #	**LPA #**	**Location**	**# of Pins**	**P/H Insp. Frequency**

Appendix

E

OTHER BRIDGE FORMS

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INVENTORY INSPECTION REPORT

County Number (3) _____ Structure No. (8) _____

Route Number (5D) _____ State Ref. Pt. _____

City Bridge No. _____ Year Built (27) _____

Latitude (16) _____

Longitude (17) _____

Location Description (9) _____

Feature Crossed (6A) _____

Feature Carried (7) _____

Contractor _____

Type of Work _____

Project Number _____

Notice of Acceptance Date _____

Pictures (New Structures)

- Approach View _____
- Elevation View _____
- Channel Profile _____
- Defects _____
- All Attached Utilities _____
- Unique Features _____

Pictures (Widened or Repaired Structures)

- View of Improvement _____
- Revised Channel Profile _____
- Defects _____
- New or Revised Attached Utilities _____
- Unique Features _____

Inspected By _____

Inspected On _____ Month _____ Day _____ Year

DECK

DECK CONDITION (58) [ ] _____

_____

_____

_____

Bridge Roadway Width, Curb to Curb (51) _____FT

Deck Width, Out to Out (52) _____FT

Approach Roadway Width (32) _____FT Route Horizontal Clearance (47) _____FT

Structure Flared (35) [ ] Yes [ ] No

Number of Lanes On (28A) _____ Number of Turning/Transition Lanes On _____

Min Vertical Clearance (Over Route) (10) _____FT

Min Vertical Clearance (Over Bridge) (53) _____FT

Deck Type (107) _____

Wearing Surface Type (108A) _____ Thickness _____IN

Type of Membrane (108B) _____

Deck Protection (108C) _____

Railing Type _____

Expansion Joint Type _____

Manufacturer's Name _____

Deck Drainage Type _____

Left Curb or Sidewalk Width (50A) _____FT

Right Curb or Sidewalk Width (50B) _____FT

Bridge Median (33) [ ] None [ ] Open [ ] Closed

Type _____ Width _____FT

Light on Bridge [ ] Yes [ ] No

Vertical Clearance (Over) _____FT _____IN

SUPERSTRUCTURE

SUPERSTRUCTURE RATING (59) [ ] _____

_____

Unit# _____ Type _____ Spans _____

Unit# _____ Type _____ Spans _____

Unit# _____ Type _____ Spans _____

Unit# _____ Type _____ Spans _____

Structure Length (EWS to EWS along centerline roadway) (49) _____FT

Maximum Span Length (48) _____FT Number of Spans (45) _____

Main Span Design Type (43B) _____

Main Span Material Type (43A) _____

Number of Approach Spans (46) _____

Approach Span Design Type (44B) _____

Approach Span Material Type (44A) _____

Skew (34) _____ Degrees [ ] Left [ ] Right Curvature _____

Widening Type _____

Number of Girders _____

Paint System _____

Bearing Type _____

Attachments _____

SUBSTRUCTURE

SUBSTRUCTURE CONDITION (60) [ ] _____

_____

Abutment Type _____

Abutment Footing Type _____

Pier Type _____

Pier Footing Type _____

Paint System _____

Berm Protection _____

Wet Condition Assessment ("Wet" applies only if water is in contact with any substructure element.)

[ ] Not Wet [ ] Two Feet To Four Feet Wet*

[ ] Less Than Two Feet* [ ] Greater Than Four Feet*

* - Wet (Photo Required)

CULVERT

CULVERT RATING (62) [ ] _____

_____

Unit# _____ Type _____ Spans _____

Unit# _____ Type _____ Spans _____

Structure Length (Face of Support to Face of Support along centerline roadway) (49) _____FT

Maximum Span Length (48) _____FT Number of Spans (45) _____

Main Span Design Type (43B) _____

Main Span Material Type (43A) _____

Skew (34) _____ Degrees [ ] Left [ ] Right

Widening Type _____

Bridge Roadway Width, Curb to Curb (51) _____FT

Deck Width, Out to Out (52) _____FT

Approach Roadway Width (32) _____FT Route Horizontal Clearance (47) _____FT

Structure Flared (35) [ ] Yes [ ] No

Number of Lanes On (28A) _____ Number of Turning/Transition Lanes On _____

Min Vertical Clearance (Over Route) (10) _____FT

Min Vertical Clearance (Over Bridge) (53) _____FT

Depth of Fill _____FT *-If top slab is at grade then items 107 and 108 need to be coded.

Deck Type (107)* _____

Wearing Surface Type (108A)* _____ Thickness _____IN

Type of Membrane (108B)* _____

Deck Protection (108C)* _____

Deck Drainage Type _____

Railing Type _____

Left Curb or Sidewalk Width (50A) _____FT

Right Curb or Sidewalk Width (50B) _____FT

Bridge Median (33) [ ] None [ ] Open [ ] Closed
Type _____ Width _____FT
Vertical Clearance (Over) _____FT _____IN
Wing Treatment Upstream [ ] Flared [ ] Straight
Wing Treatment Downstream [ ] Flared [ ] Straight
Attachments _____

CHANNEL

CHANNEL RATING (61) [ ] _____

_____

_____

_____

Channel Protection _____

APPRAISAL RATINGS

APPROACH ROADWAY ALIGNMENT RATING (72) [ ] _____

_____

Approach Roadway Width (32) _____FT Relief Slots _____

Traffic Safety Features [ ] [ ] [ ] [ ]

Guardfence Lengths (ft.)

Apr. Lt. _____ Apr. Rt. _____ Exit Lt. _____ Exit Rt._____

Guardfence End Treatment _____

Signing

Apr. Lt. _____ Apr. Rt. _____ Exit Lt. _____ Exit Rt._____

Comments _____

UNDERCLEARANCE INFORMATION

Number of Lanes Under (28B) _____

Min Vertical Underclearance (Under Bridge) (54B) _____FT

Min Lateral Underclearance RT (Under Bridge) (55) _____FT

Min Lateral Underclearance LT (Under Bridge) (56) _____FT

Guardfence Lengths Under (ft.)

LT. _____ LT. Ctr. _____ RT. _____ RT. Ctr. _____

WATERWAY ADEQUACY RATING (71) [ ] _____

RECOMMENDED MAINTENANCE _____

_____

_____

Available from KART (**http://kart.ksdot.org/**)

Kansas Department of Transportation

KDOT-BUREAU OF LOCAL PROJECTS
NON-STATE SYSTEM BRIDGE INSPECTION PROGRAM
CRITICAL INSPECTION FINDING

Structure No.:		**LPA Structure No.:**	
Feature Carried (NBI Item 7):		**Feature Crossed (NBI Item 6):**	
Location (Item 9):		**City/County**	
Inspection Date:		**Date Owner & BLP Notified:**	
Type of Inspection:		**Team Leader:**	
Consultant:		**Telephone:**	

Findings / Recommendations for CIF (Should match findings in Bridge Inspection Report):

☐ **New Load Rating/Analysis Req'd.** **Overall Recommendation**

Trigger **Qualifier**

CIF #1	**Deficiency/Distress**	**Material**	**Reference Feature**
CIF #2	**Deficiency/Distress**	**Material**	**Reference Feature**

Condition Ratings (Report All):

☐ **NBI Item 58 - Deck**	☐ **NBI Item 59 - Superst.**	☐ **NBI Item 60 - Substr.**
☐ **NBI Item 61 - Channel**	☐ **NBI Item 62 - Culvert**	☐ **NBI Item 113 - Scour Crit.**

Bridge Owner Response (Must be reported to KDOT BLP within 14 days of receipt):

Scan or save to PDF and email to: KDOT.BLPBridge@ks.gov
with "Critical Inspection Finding" in Subject Line or select "Email" to the right.
IF EMERGENCY, CALL BLP PROGRAM MGR. IMMEDIATELY (785) 296-0410

KART - April 2017

Available from KART (**http://kart.ksdot.org/**)

Item 113 Justification Form | Bridge Owner

Structure Information

NBI Structure Number	
County Structure Name	
POA Required?	YES/NO
Date Delivered	
Critical Inspection Finding?	YES/NO
Date Delivered	

Owner	
Year Constructed	
Feature Intersected	
Facility Carried	
Location	

Summary of Scour Analysis

Abutment Scour Recommended Item 113	
Rock Scour Recommended Item 113	
Long Term Degradation (ft)	
Contraction /Pressure Flow Scour Depth (ft)	
Pier Scour Depth (ft)	
Total Assessed Scour Depth (ft)	
Pier Foundation Depth (ft)	
Distance from Foundation to Channel Bed (ft)	
Corresponding Item 113 Code	
Extensive Scour Observed?	

Current Item 61 Rating	
Current Item 62 Rating	
Extensive Scour Observed	YES/NO

Comments:

HEC-18 Scour Analysis Results

HEC-18 Date Completed	
HEC-18 Recommended Item 113	

HEC-18 Summary:

Final Recommended Item 113 Code	

Kansas Department of Transportation-Plan of Action

Page 1 of 7

Date:

POA SUMMARY

Date Delivered	Structure Number	Item 113

Photo

Location

Year Built	Average Daily Traffic	Facility Carried

County

Bridge Closure Contact Person

Emergency Contact (Department, Name, Phone Number)

Reason For POA

Recommended Structural/Hydraulic Countermeasure

Pier Foundation

Abutment Foundation

Potential Action Items for Improving Item 113

Criteria for Closing and Re-Opening Bridge

Bridge Owner: Place this document and all respective attachments in the corresponding bridge information packet for future reference.
Bridge Inspectors: Upon each inspection this document shall be reviewed and updated (See Section 2) to reflect the site specific conditions. When inspection is complete scan the updated POA and email it to BLP_BRIDGE@KSDOT.ORG. If necessary, a new hard copy of the updated POA will then be issued to the bridge owner to placed back in the bridge information packet.

Section 1. General Information

Structure Number	County Name	County Bridge Number	Location

Feature Crossed	Facility Carried	Plans Available?	Culvert?	Phase I Score

KDOT Code - Main Spans -Material	KDOT Code - Main Spans - Design

Pier Foundation

Abutment Foundation

Channel Bottom Material

Is bridge located in a critical path? If so, describe

Section 2. POA Responsibility

Author(s) of POA [Name, Title, Contact Information]	Date

Concurrences on POA [Name, Title, Contact Information]

POA Update Frequency	Date of Next Update

POA Updated by	Date Updated

Items Updated or is Plan Still Valid?

Note: If POA Status Remains Unchanged Proceed to POA Update Log Located After Section 10.

Section 3. Scour Vulnerability

Current Item 113 Code	Source of Current Scour Critical Code

Scour Evaluation Summary

Scour History

Section 4. Recommended Action(s)

	Recommended		Implemented	
a. Increased Inspection Frequency	☐ Yes	☐ No	☐ Yes	☐ No
b. Fixed Monitoring Device(s)	☐ Yes	☐ No	☐ Yes	☐ No
c. Flood Monitoring Program	☐ Yes	☐ No	☐ Yes	☐ No
d. Hydraulic/Structural Countermeasures	☐ Yes	☐ No	☐ Yes	☐ No
e. Debris Removal/Monitoring	☐ Yes	☐ No	☐ Yes	☐ No

Section 5. NBIS Coding Information

Current Item 60-Substructure	Previous Item 60-Substructure
Current Item 61-Channel & Channel Protection	Previous Item 61-Channel/Channel Protection
If Culvert, Item 62 Code	Previous Item 71-Waterway Adequacy
Current Item 71-Waterway Adequacy	Previous Item 113 Code
Current Item 113 Code	

Coding Comments

Section 6. Monitoring Program

☐ **Regular Inspection Program**

Items to Watch

☐ **Increased Inspection Frequency**

Recommended Frequency and Items to Watch

☐ **Underwater Inspection Required or Increased Frequency**

Recommended Frequency and Items to Watch

Section 6 (continued) Monitoring Program

☐ **Fixed Monitoring Device(s)**

Sample Interval ☐ 30 min ☐ 1 hr ☐ 6 hrs ☐ 12 hrs ☐ 24 hrs

Type of Instrument, Installation Location, and Frequency of Data Review

Scour Alert Criteria for each Pier/Abutment

Scour Critical Criteria for each Pier/Abutment

Criteria for Termination of Fixed Monitoring Program

☐ **Flood Monitoring Program**

Flood Monitoring Required ☐ Yes ☐ No

Frequency of Flood Monitoring: ☐ 1 hr ☐ 3 hrs ☐ 6 hrs ☐ 12 hrs

Type: ☐ Visual Inspection

☐ Instrument (Check all that apply)

☐ Portable ☐ Geophysical ☐ Sonar ☐ Other

Flood Monitoring Event Defined by (check all that apply)

☐ Discharge _____ ☐ Stage _____

☐ Rainfall Intensity _____ ☐ Elevation Measured from _____

Post-Flood Monitoring Required ☐ Yes ☐ No

Frequency of Post-Flood Monitoring: ☐ Daily ☐ Weekly ☐ Monthly

Criteria for Termination of Flood Monitoring

Criteria for Termination of Post Flood Monitoring

Flood Monitoring Program Scour Alert Criteria

Flood Monitoring Program Scour Critical Criteria

Section 6 (continued) Monitoring Program

☐ **Debris Monitoring Program**

Debris Monitoring Required ☐ Yes ☐ No

Frequency of Debris Monitoring ☐ Monthly ☐ Bi-Annually ☐ Other

Debris Monitoring Criteria and Items to Watch

Note: Additional Details for action(s) required may be included in Section 8.

Action(s) Required if Scour Alert Criteria Detected (include notification and closure procedures)

Action(s) Required if Scour Critical Criteria Detected (include notification and closure procedures)

Agency and Department Responsible for Monitoring

Montoring Contact Person [Name, Title, Contact Information]

Section 7. Countermeasure Recommendations

☐ Monitoring Countermeasure (See Section 6 and Section 10-Attachment E)

☐ Structural/Hydraulic Countermeasure (See Section 10-Attachment E)

Prioritize alternatives below.

Countermeasure #1

Countermeasure #2

Countermeasure #3

Basis for Selected Countermeasure

Agency and Department Responsible for Countermeasure Program

Countermeasure Contact person [Name, Title, Contact Information]

Countermeasure Impletemented by

Section 8. Bridge Closure Plan

Scour Monitoring Criteria for Consideration of Bridge Closure:

- ☐ Discharge
- ☐ Water Surface Elevation Reaches
- ☐ Bridge is in Pressure Flow
- ☐ Heavy Debris Accumulation
- ☐ Overtopping of Roadway or Structure
- ☐ Movement of Riprap/Other Armor Protection
- ☐ Scour Measurement Results/Monitoring Device (See Section 6
- ☐ Loss of Embankment or Abutment Fill Slope
- ☐ Observed Structure Movement/Settlement

Agency and Department Responsible for Bridge Closure

Bridge Closure Contact Person [Name, Title, Contact Information]

Criteria for Re-Opening Bridge

Agency and Person Responsible for Re-Opening after Inspection

Section 9. Detour Route

Detour route Description (include bridges on detour route, their Item 113 Code and place map in Attachment G)

Traffic Control Equipment and Locations

News Release, Other Public Notice (include authorized person(s), information to be provided and limitations)

Section 10. Attachments

Indicate all documents and materials being submitted with this POA

- ☐ Attachment A-Boring Logs and/or Subsurface Information
- ☐ Attachment B-Cross Sections from Current and Previous Inspections
- ☐ Attachment C-Bridge Elevation Showing Existing Streambed, Foundation Depths, and Observed, Assessed, and/or Calculated Scour Depths
- ☐ Attachment D-Plan View Showing Location of Scour Holes, Debris, etc.
- ☐ Attachment E-Supporting Documentation, Calculations, and Conceptual Designs for Scour Countermeasures
- ☐ Attachment F-Representative Photographs
- ☐ Attachment G-Map Showing Detour Route

POA Update Log

Populate in lieu of Section 2 only if there are no changes in conditions and Plan of Action is still valid as written.

Update #1

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #2

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #3

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #4

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #5

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

POA Update Log	*Populate in lieu of Section 2 only if there are no changes in conditions and Plan of Action is still valid as written.*

Update #1

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #2

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #3

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #4

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Update #5

POA Update Frequency	Date of Next Update	Date Updated

POA Updated by

Noteworthy Items:

Kansas Department of Transportation - Bureau of Local Projects

Plan of Action Retirement Sheet for Local Bridges

FHWA Bridge No.: _____ Bridge Owner: _____
Local Bridge ID.: _____ Year Built: _____
Feature Crossed: _____ Date POA was Issued: _____
Facility Carried: _____ Date POA was Retired: _____

NBI Condition Ratings:

Previous Item 113: _____ Current Item 113: _____
Previous Item 60: _____ Current Item 60: _____
Previous Item 61: _____ Current Item 61: _____
Previous Item 71: _____ Current Item 71: _____

Inspection Frequency:

Previous Inspection Frequency: _____ Current Inspection Frequency: _____

Special Inspection Performed? ☐ Yes ☐ No Date of Special Inspection: _____

Additional Comments *(include any countermeasure design details, assumptions, and hand calculation references)*

Bridge Inspection Team Leader:

Professional Engineer:

(PE Seal & Date)

This document shall accompany the updated Plan of Action (See Section 2 of the Plan of Action) within the owner's bridge records to reflect the corrective action taken by the bridge owner as noted by the Bridge Inspection Team Leader and Engineer licensed in the State of Kansas shown above. When implementation and inspection is complete, attach this form to the most current POA and email it to BLP_BRIDGE@KSDOT.ORG.

Issued August 2013

BLANK LOAD RATING SUMMARY SHEET

Load Rating Summary Sheet for Local Bridges

NBI Bridge # :	000000000045310	**County:** Allen	Inspection Key :		ADT :	125	vpd
LPA Bridge ID :	22	**Owner:** Iola PCG	Year Built :	2019	ADTT :	05	%
Route Carried :	RS 110		Year Reconst. :		f'_c :	4.0	ksi
NBI Item 43 :	402 SBMC		Design Load :	HL93	f_y :	60.0	ksi
Structure Type :	Steel Beam, Continuous				F_y :	50.0	ksi

Rating Information Provided : ☑ Plans ☐ Field Measurements ☐ Testing ☐ No Information Exists

Load Rating Manuals:		General Load Rating Information:		Condition Ratings:	
		Overburden Type :	None	Deck:	8
LFR/ASR Version :	N/A	Overburden (in.) :		Superstructure:	8
LRFR Version :	2017 AASHTO Design Specs (8th Ed.)	Overlay Type :	None	Substructure:	8
MBE Version :	2018 MBE (3rd Ed.)	Overlay (in.) :		Culvert:	N
		Culvert Fill Height (ft.) :	N/A	Channel:	

Method Used: LRFR

$\gamma_{LL\,INV}$: 1.75 γ_C : 0.85
$\gamma_{LL\,OP}$: 1.35 γ_S : 1.0

	Truck	Tons	RF_{INV}	$Tons_{INV}$	RF_{OP}	$Tons_{OP}$	Controlling Structural Element
Design	HL-93	---	1.310	-------	1.830	-------	-M Girder/Beam Int
	HS20-44	36	-------	-------		-------	
AASHTO Load Rating	T3	25	-------	-------	3.238	80.9	-M Girder/Beam Int
	T3S2	36	-------	-------	2.576	92.7	-M Girder/Beam Int
	T3-3	40	-------	-------	2.560	102.4	-M Girder/Beam Int
	SU4	27	-------	-------	2.949	79.6	-M Girder/Beam Int
	SU5	31	-------	-------	2.604	80.7	-M Girder/Beam Int
	SU6	34.75	-------	-------	2.336	81.1	-M Girder/Beam Int
	SU7	38.75	-------	-------	2.115	81.9	-M Girder/Beam Int
	NRL	40	-------	-------	2.036	81.4	-M Girder/Beam Int
	EV2	28.75	-------	-------	3.415	98.1	-M Girder/Beam Ext
	EV3	43	-------	-------	2.293	98.5	-M Girder/Beam Ext

Load Rating Evaluation Summary :
(Areas investigated in load rating)

+M Girder/Beam ☑ Int ☑ Ext
-M Girder/Beam ☑ Int ☑ Ext
☐ -M Slab ☐ +M Slab
☐ Culvert Walls
☑ Shear at/near Supports
☐ Truss Members
☐ Floor Beams
☐ Stringers
☐ Pins
☐ Hangers
☐ Fatigue Prone Details
☐ Deck Overhang
☐ Deck between Girders
☐ Substructure (NBI Item 60 < 4)
☐ Masonry Arch
☐ CMP

See next page for posting requirements

NBI Item 70 (Relationship of Operating Rating to Maximum Legal Load) :
Equal to or above legal loads

Additional Comments *(include any section loss, assumptions, hand calc. references, etc.)*
AASHTOWare BrR Version 6.8.3 model was used to generate this load rating based on design plans. A new, sealed Load Rating Summary Sheet will be required with any new load rating or if the BrR model is modified.

Printed Name (P.E.): Wizard of Oz
License #: 3003
P.E. Licensed in Kansas
Seal & Date

Company : ABCD
Analyst : SBS
Analysis Date : 11/21/2018

The Rating(s) for this structure is (are) based on a theoretical analysis of the structural elements involved, and on a limited amount of information concerning their condition. The calculated values are the maximum posting limits. The LPA shall not post the structure at a load exceeding these values. The LPA may decide to post the structure at lower load limits.
Revised 5-21-2019

Available from KART (**http://kart.ksdot.org/**)

Kansas Department of Transportation

Load Rating Summary Sheet for Local Bridges

NBI Bridge # :	000000000045310	**County:**	Allen
LPA Bridge ID :	22	**Owner:**	Iola PCG
Route Carried :	RS 110		

Maximum Legal Posting Limits

NO POSTING NECESSARY

Available from KART (**http://kart.ksdot.org/**)

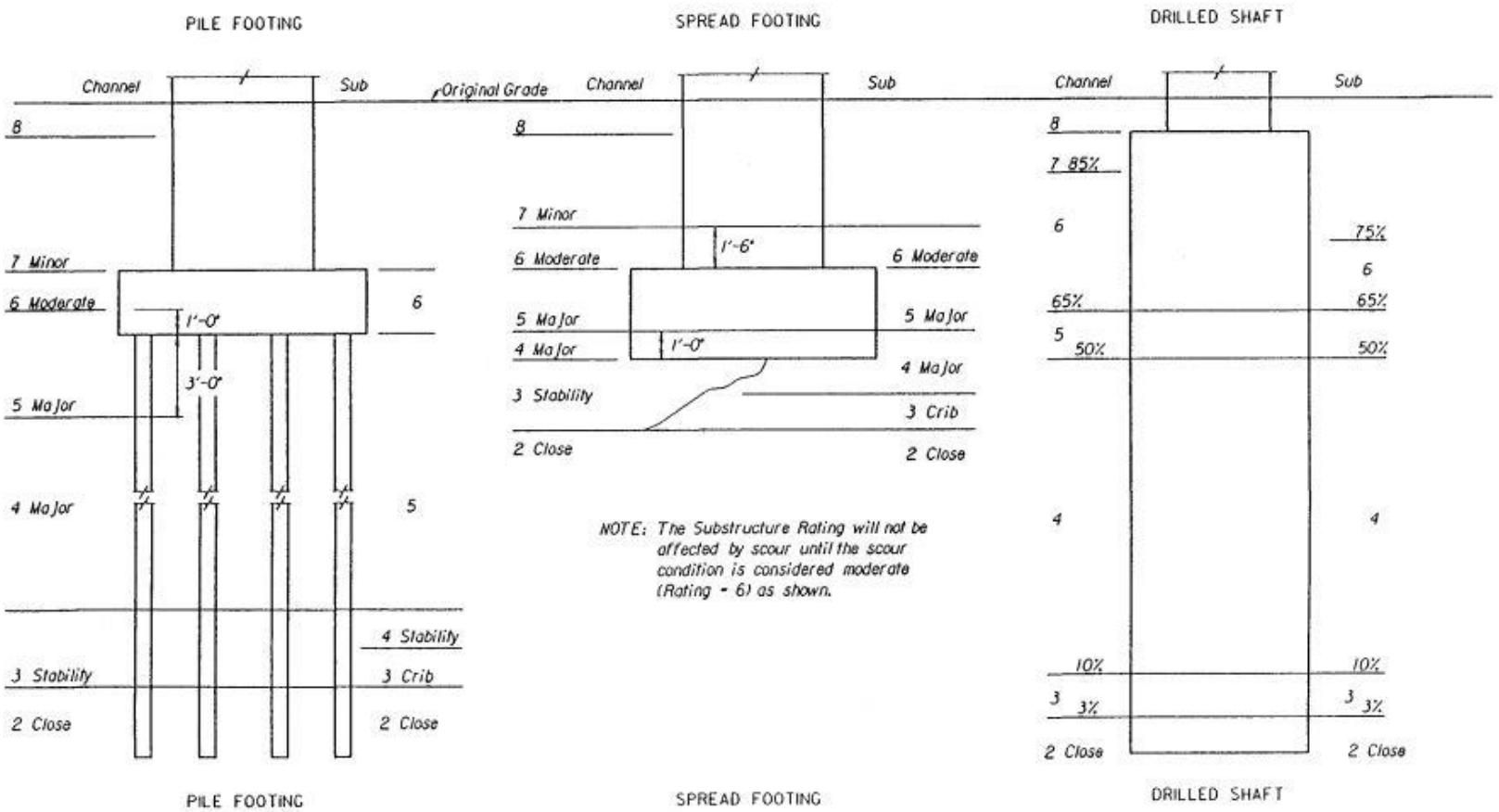
Appendix

F

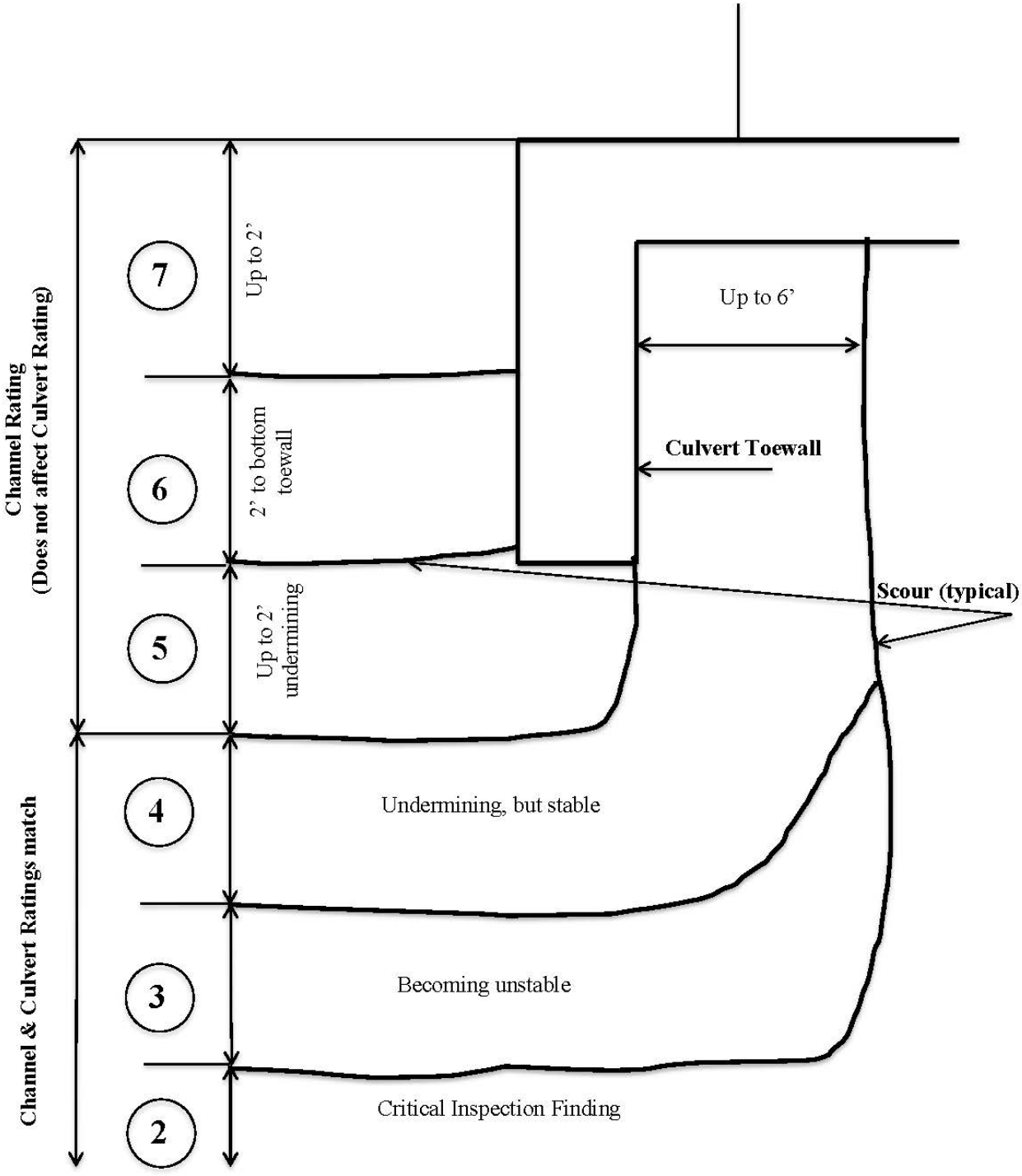
BRIDGE INSPECTION AIDS

TABLE OF CONTENTS

KANSAS DEPARTMENT OF TRANSPORTATION
CHANNEL AND SUBSTRUCTURE RATINGS
AS A RESULT OF SCOUR



Channel and Culvert Ratings as a Result of Scour



Note:
1) Culvert/Channel rating applies to worst case at either "entrance" or "exit" end of culvert.
2) Scour must be full width of the opening.
3) Unstable wings due to scour will lower culvert rating to a "7" and a channel rating to a "6".
4) Failed wings due to scour will lower culvert rating to a "6" and a channel rating to a "6".

KDOT - Bureau of Local Projects - Bridge ~~Team~~ Information

To help us respond more quickly to your local bridge questions, please include one of the following topics in the "Subject" line when using the KDOT-BLP-Bridge Team Email at **KDOT.BLPBridge@ks.gov**

For LOCAL BRIDGE INSPECTION Topics

- Inspection Submittal
- Fracture Critical
- Element Level
- Critical Inspection Finding
- Scour Critical
- Bridge Posting
- Bridge Closure
- Bridge Removal
- Bridge Transfer
- Inspection Questions
- Under 3 Ton Weight Limit
- Discipline
- Statewide Contract
- NHI Course
- Bridge School
- Inspection Team Leader
- Bridge Inspection Manual
- New Bridge Number

For LOCAL BRIDGE DESIGN Topics

- Bridge Design Questions
- Bridge Design Manual
- Load Rating

For LOCAL BRIDGE CONSTRUCTION Topics

- Construction Questions
- Shop Drawings
- Falsework Plans
- Demolition Plans
- Kansas Local Bridge Improvement Program
- As-Built Plans
- Pile Logs
- RCB-RFB Designs
- RCB-RFB Standards
- Erection Plans

For BRIDGE INSPECTION PORTAL (BIP) or LOCAL BRIDGE DATA Topics

- Bridge Inspection Portal
- Bridge Data

Bridge Inspection Information
(Local Bridge Inspection Team Leaders List;
Bridge Inspection Manual, Documents and Forms, and Scope of Services)

http://www.ksdot.org/bureaus/burlocalproj/default.asp

Bridge Inspection Portal (BIP)

http://bridgeport.ksdot.org/KDOTBLP/login1.aspx

KDOT - Bureau of Local Projects - Bridge Team Members

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Engineering Data Manager
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Email: **Ed.Lewis@ks.gov**

MAIN LINE
(785) 296-3861
Kimberly Marotta
Administrative Specialist

T3S2 (2-Unit Vehicle)

The following are examples governed by the two-unit vehicle silhouette. A two-unit vehicle consists of a driver unit and detachable trailer. The maximum GVW is 43 tons.

T3-3 (3-Unit Vehicle)

The following are examples governed by the three-unit vehicle silhouette. A three-unit vehicle consists of a driver unit and two detachable trailers. The maximum GVW is 43 tons.

EV (Emergency Vehicle)

The following are examples of emergency vehicles. In the absence of an R12-7 or R12-7a sign, this vehicle is governed by the R12-1 sign or R12-5 sign single unit vehicle silhouette. An emergency vehicle consists of a driver and trailer unit not designed to be detached.

KS Local Bridge Load Postings

Purpose: This brochure is intended to help local public agencies understand bridge load postings.

Local Bridge Rating

Bridge load postings are required for safety and federal regulations when a bridge does not have enough capacity to safely support the State of Kansas' Legal Loads. The postings are meant to prevent heavy loads from causing stress above the structure's safe load capacity limit (operating rating). For bridges with load restrictions below the Kansas Legal Load, the bridge owner is required by federal regulations to install weight limit signs in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). There are a number of signing options depending on the circumstances. All vehicles, including farm use vehicles such as combines and tractors, etc., are required to follow regulatory posting signs.

Sign R12-1

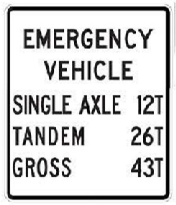
Posting sign R12-1 is an alternate to the multi-truck sign R12-5. The gross weight for any vehicle is limited to the posted weight on the sign, regardless of the vehicle configuration and number of axles. This sign is more appropriate on low weight limit bridges where the weight limit on 2 or 3 unit trucks is less than their empty weight.

Sign R12-5

Posting sign R12-5 is commonly used when load restrictions exist for both single unit and multi-unit vehicles. The R12-5 sign uses generic truck silhouettes to represent three different vehicle configurations. The weight corresponding to each truck silhouette is the gross vehicle weight (GVW) allowed for that type of vehicle. It is important to note that the number of axles shown in the R12-5 sign may differ from the actual axle configuration of the truck. (See typical silhouette configurations on the back.)

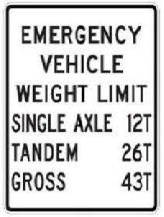
EMERGENCY VEHICLES

In 2018, legal weights of emergency vehicles (fire trucks) were increased dramatically; see K.S.A. 8-1920. Legal weights of fire trucks are 86,000 lb. gross, 24,000 lb. single axle, and 62,000 lb. tandem axle. Kansas Law does not exempt emergency vehicles from size and weight limitations on bridges. In some cases, weight limit signs will be needed that only apply to emergency vehicles.



Sign R12-7aP

Posting sign R12-7aP is displayed below a traditional weight limit sign when the bridge operating rating is below the state legal load for emergency vehicles.



Sign R12-7

Posting sign R12-7 is a stand-alone sign used when the bridge is not posted for other trucks but the operating rating is below the state legal load for emergency vehicles.

T3 & SHV (Single Unit Vehicle)

The following are examples governed by the single unit vehicle silhouette. A single unit vehicle has a driver and trailer unit not designed to be detached. The maximum GVW is 27 tons.

CODE	ITEM 43	STRUCTURE TYPE FOR BRIDGES
AAR	919	Aluminum Arch
CAR	319	Corrugated Metal Arch (Concrete Footings)
CLP	319	Corrugated Metal Long Span Pipe (Elliptical Bolted Structural Plate Sections)
CMP	319	Corrugated Metal Pipe (Round or Elliptical)
CSP	319	Corrugated Metal Structural Plate Pipe (Round Bolted Structural Plate Sections)
MAR	819	Stone Masonry Arch
MFAF	811	Stone Masonry Filled Spandrel Arch, Fixed
PBGS	505	Prestressed Concrete Box Girder, Simple
PBMC	602	Prestressed Concrete Beam, Continuous
PBMS	502	Prestressed Concrete Beam, Simple
PDGC	604	Prestressed Concrete Deck T-Girder, Continuous
PDGS	504	Prestressed Concrete Deck Girder, Simple
PITC	604	Prestressed Concrete Inverted T-Girder, Continuous
PITS	504	Prestressed Concrete Inverted T-Girder, Simple
PVSC	601	Prestressed Concrete Voided Slab, Continuous
RAR	119	Reinforced Concrete Arch
RARC	211	Reinforced Concrete Arch, Continuous
RBGC	205	Reinforced Concrete Box Girder, Composite and Continuous
RBGS	105	Reinforced Concrete Box Girder, Simple
RBMP	102	Reinforced Concrete Beam, Encased
RBMP	202	Reinforced Concrete Beam, Encased and Continuous
RCB	119	Reinforced Concrete Box Culvert
RCSC	201	Reinforced Concrete Slab, Continuous
RCSD	201	Reinforced Concrete Slab, Continuous and Drop-Panel
RCSH	201	Reinforced Concrete Slab, Continuous and Parabolic Haunched
RCSL	201	Reinforced Concrete Slab, Continuous and Linear Haunched
RCSR	201	Reinforced Concrete Slab, Continuous and Circular Haunched
RCSS	101	Reinforced Concrete Slab, Simple
RDGC	204	Reinforced Concrete Deck T-Girder, Continuous
RDGD	204	Reinforced Concrete Deck T-Girder, Continuous and Drop-Panel
RDGH	204	Reinforced Concrete Deck T-Girder, Continuous and Parabolic Haunched
RDGL	204	Reinforced Concrete Deck T-Girder, Continuous and Linear Haunched
RDGR	204	Reinforced Concrete Deck T-Girder, Continuous and Circular Haunched
RDGS	104	Reinforced Concrete Deck T-Girder, Simple
RFAF	111	Reinforced Concrete Filled Spandrel Arch, Fixed
RFB	119	Reinforced Concrete Rigid Frame Box Culvert
RISC	201	Reinforced Concrete Illinois Bulletin Slab, Continuous
RISD	201	Reinforced Concrete Illinois Bulletin Slab, Continuous and Drop-Panel
RISS	101	Reinforced Concrete Illinois Bulletin Slab, Simple
RMP	119	Reinforced Concrete Pipe
ROAF	111	Reinforced Concrete Open Spandrel Arch, Fixed

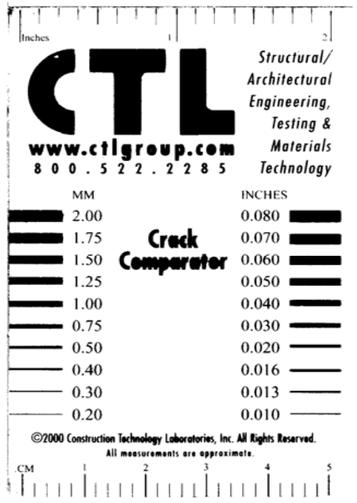
CODE	ITEM 43	STRUCTURE TYPE FOR BRIDGES
RRF	119	Reinforced Concrete Rigid Frame Culvert (No floor)
RSGC	203	Reinforced Concrete Girder-Floorbeam-Stringer, Continuous
RSGH	203	Reinforced Concrete Girder-Floorbeam-Stringer, Continuous and Haunched
RTAF	112	Reinforced Concrete Through Arch, Fixed
RTAT	112	Reinforced Concrete Through Arch, Tied
RTGC	202	Reinforced Concrete Through Girder, Continuous
RTGP	103	Reinforced Concrete Through Girder, Encased
RTGS	102	Reinforced Concrete Through Girder, Simple
RVSC	201	Reinforced Concrete Voided Slab, Continuous
RVSH	201	Reinforced Concrete Voided Slab, Continuous and Haunched
SAR	319	Steel Arch
SBCC	405	Steel Box Girder, Composite and Continuous (Multiple)
SBCC	406	Steel Box Girder, Composite and Continuous (Single or Spread)
SBGC	405	Steel Box Girder, Continuous
SBGS	305	Steel Box Girder, Simple
SBMC	402	Steel Beam, Continuous
SBMS	302	Steel Beam, Simple
SDGC	404	Steel Deck T-Girder, Continuous
SDTC	409	Steel Deck Truss, Continuous
SDTH	409	Steel Deck Truss, Continuous and Haunched
SDTS	309	Steel Deck Truss, Simple
SFCC	403	Steel Girder-Floorbeam, Composite and Continuous
SFGC	403	Steel Girder-Floorbeam, Continuous
SFGS	303	Steel Girder-Floorbeam, Simple
SHTC	410	Steel High Truss, Continuous
SHTS	310	Steel High Truss, Simple
SLTC	410	Steel Low Truss, Continuous
SLTS	310	Steel Low Truss, Simple
SMCC	402	Steel Beam, Composite and Continuous
SMCS	302	Steel Beam, Composite and Simple
SMP	319	Steel Pipe
SOAF	311	Steel Open Spandrel Arch, Fixed
SRFC	407	Steel Rigid Frame, Composite and Continuous
SRGC	402	Steel Riveted Plate Girder, Continuous
SRGH	402	Steel Riveted Plate Girder, Continuous and Haunched
SRGS	302	Steel Riveted Plate Girder, Simple
SSCC	403	Steel Girder-Floorbeam-Stringer, Composite and Continuous
SSGC	403	Steel Girder-Floorbeam-Stringer, Continuous
SSGH	403	Steel Girder-Floorbeam-Stringer, Continuous and Haunched
SSGS	303	Steel Girder-Floorbeam-Stringer, Simple
STAF	312	Steel Through Arch, Fixed
STAT	312	Steel Through Arch, Tied
STGC	402	Steel Through Girder, Continuous
STGS	302	Steel Through Girder, Simple
SWCC	402	Steel Welded Plate Girder, Composite and Continuous
SWCH	402	Steel Welded Plate Girder, Composite, Continuous and Haunched

CODE	ITEM 43	STRUCTURE TYPE FOR BRIDGES
SWCS	302	Steel Welded Plate Girder, Composite and Simple
SWGC	402	Steel Welded Plate Girder, Continuous
SWGH	402	Steel Welded Plate Girder, Continuous and Haunched
SWGS	302	Steel Welded Plate Girder, Simple
TBMC	702	Timber Beam, Continuous
TBMS	702	Timber Beam, Simple
TSSC	701	Timber Structural Slab, Continuous
TSSS	701	Timber Structural Slab, Simple
WBCC	405	Weathering Steel Box Girder, Composite and Continuous (Multiple)
WBCC	406	Weathering Steel Box Girder, Composite and Continuous (Single or Spread)
WBMC	402	Weathering Steel Beam, Continuous
WBMS	302	Weathering Steel Beam, Simple
WLTS	310	Weathering Steel Low Truss, Simple
WMCC	402	Weathering Steel Beam, Composite and Continuous
WMCS	302	Weathering Steel Beam, Composite and Simple
WWCC	402	Weathering Steel Welded Plate Girder, Composite and Continuous
WWCH	402	Weathering Steel Welded Plate Girder, Composite, Continuous and Haunched
WWGC	402	Weathering Steel Welded Plate Girder, Continuous
WWGH	402	Weathering Steel Welded Plate Girder, Continuous and Haunched
XBGC	605	Reinforced Concrete Box Girder, Post-Tensioned, Composite and Continuous
XBGS	505	Post-Tensioned Box Girder, Simple
XCSH	601	Reinforced Concrete Slab, Post-Tensioned, Continuous and Parabolic Haunched
YAR	119	Precast Reinforced Concrete Arch
YBMS	102	Precast Reinforced Concrete Beam, Simple
YBMS	122	Precast Reinforced Concrete Channel Beam, Simple
YCB	119	Precast Reinforced Concrete Box Culvert
YFB	119	Precast Reinforced Concrete Rigid Frame Box Culvert

APPROACH RDWY ALIGNMENT	DECK	SUPER	SUB	CULVERT	CHANNEL	WATERWAY ADEQUACY
8 Equal to present desirable criteria.	No spalling, scaling delams, or map cracks, T-cracks ≤ 0.5 mm Total deterioration ≤ 2%	Conc. Use deck criteria, Steel no visible rust, Timber no cracking or splitting in beams	Good condition, No repairs needed ≤ 0.5 mm conc. cracks	Good Condition, No repairs, Hz. cracks ≤ 0.2 mm Metal sym. curv./no pitting	Alignment good, No brush or drift	OK **8**
7 Better than present minimum criteria.	Deck cracks > 0.5 mm & ≤ 1 mm, Scaling ≤ 1/4", ≤ 10% deck deter. And/or hollow planed Total deterioration ≥ 2% & ≤10%	Cracks ≤ 0.5 mm in girders, Light rust and paint peeling Minor cracking or splitting in timber	>0.5 & ≤ 1.5 mm conc. cracks, Minor water saturation, cracking with some effl., scaling or spalls w/no effect on bearing area.	Min. joint leakage, > 5% & ≤ 10% ceiling deter. w/exposed rebar Hz > 0.2 & ≤ 0.5 mm, < 1" settlemt. Metal sm. curv. top half/min. flat. btm./superficial corr./slight pitting	Minor brush, drift, or channel scour, 1' scour at toewall full length, > 10% & ≤ 20% silt in barrels	Drift 7
6 Equal to present minimum criteria.	> 10% & ≤ 20% deck deter w/ ≤ 2% spalled w/exposed rebar > 20%-100% hollow planed w/ NO spalls Deck cracks > 1 & ≤ 1.5 mm, Cracked or split planks Total deterioration > 10% & ≤ 25%	Flex/shear cracks > 0.5 mm & ≤ 1 mm, > 10% & ≤ 20% total girder ends or > 20% at a pier per span, Mod. Rust requiring paint, Past sect. loss painted over, Bearings out of alignment, Small areas exposed rebar, Mod. cracking or splitting in timber	> 1.5 & ≤ 3 mm full length conc cracks, Mod. spalls w/exposed rebar, Mod. Spalls w/exposed bearing, Minor section loss of steel, Deter. Of secondary member requires repair, Major berm erosion, Conc. Riprap bulging or sliding requires repair	> 10 & ≤ 20% ceiling deterioration w/ exposed rebar Hz > 0.5 & ≤ 2 mm full length, > 1" & ≤ 3" settlement Metal sm. curv. top half/btm. flat. signif./signif. corr./mod. pitting Evididence of backfill infiltration	Large trees/drift Moderate channel scour, 2' scour at toewall full length, > 20 % & ≤ 40% silt in barrels, Poor align in R/W	Scour or erosion **6**
5 Somewhat better than minimum adequacy to tolerate being left in place as is.	> 20% & ≤ 40% deck deter w/ > 2% & ≤ 5% spalled w/ exposed rebar, Deck cracks > 1.5 mm, Numerous rotten or crushed planks Total deterioration > 25% & < 50%	Flex/shear cracks > 1mm & ≤ 2 mm, > 20% & ≤ 40% total girder ends or > 40% at a pier per span, ≥ 5 % & ≤ 10 % sect loss secondary member, < 5% section loss primary member, Severe cracking or splitting in timber	> 3 & ≤ 5 mm full length conc cracks, Many spalls w/exposed rebar, Broken backwalls, ≤ 5% sect. loss primary member Timber deter. w/ ≤ 25% member requires replacement, Riprap failed	> 20 & ≤ 40% ceiling deterioration w/ exposed rebar Hz > 2 & ≤ 4 mm full length & no bow, Wing failed > 3" & ≤ 6" settlement Metal signif. distortion isol. top half, extr. flat. btm. /Defl. of pipe Signif. corr./deep pitting	Major channel scour, 3' scour at toewall full length, > 40% silt in barrels	Highwater on super **5**
4 Meets minimum tolerable limits to be left in place as is.	> 40% & ≤ 60% deck deter w/ > 5% spalled w/ exposed rebar Majority of planks rotten, crushed and/or splitting Total deterioration ≥ 50%	> 40% total girder ends or > 60% at a pier per span, > 2 mm flex/shear cracks in critical areas, > 10% section loss secondary member, ≥ 5% section loss primary member, Fatigue/out of plane bending	Severe spalls w/ exposed rebar ≤ 10% section loss primary mem. Timber deter. w/ > 25% & ≤ 50% member requires replacement, Severe scour or undermining of footings effecting stability,	> 40% ceiling deterioration w/ exposed rebar, Holes in walls /slab/floor. Hz. Cracks>4mm full length & visible bow > 6" settlement, Metal marginal signif. distort. thru-out/Lower third may be kinked. Extensive corrosion/deep pitting	Scour exposing piling or bottom of footings, Major work needed to stabilize channel or banks	Occasional highwater over bridge **4**
3 Basically intolerable requiring high priority of corrective action.	> 60% deck deterioration, Many full-depth failures, Critical signs of timber distress (sagging)	Open flex/shear cracks, out of plane bending cracks and/or severe section loss in critical areas	Serious Condition, Needs repair work	Serious Condition, Needs repair work to stabilize Metal extr. distort. isol. location/ Flat. of crown/Extensive corrosion	Serious Condition, Requires immediate repair, Integrity of bridge is threatened	Frequent highwater over bridge **3**
2 Basically intolerable requiring high priority of replacement.	Critical Condition-Structure should be closed until repairs are completed or structural eval. completed by PE licensed in KS	Critical Condition-Structure should be closed until repairs are completed or structural eval. completed by PE licensed in KS	Critical Condition-Structure should be closed until repairs are completed or structural eval. completed by PE licensed in KS	Critical Condition-Structure should be closed until repairs are completed or structural eval. completed by PE licensed in KS	Critical Condition-Structure should be closed until repairs are completed or structural eval. completed by PE licensed in KS	Frequent overtopping of bridge and roadway **2**
1 This value of rating not to be used.	Facility Closed	Facility Closed	Facility Closed	Facility Closed	Facility Closed	1

REQUIRED PHOTOGRAPHS FOR ROUTINE & SPECIAL INSPECTIONS MUST BE IN COLOR & DIGITAL FORMAT

1) Roadway Approach View(s)
2) Elevation View (noting wet piers)
3) Typical Superstructure
4) Upstream and Downstream views
5) Any Condition Rating of 4 or Less
6) Typical Defects
7) Utility Attachments
8) Damaged Expansion Joints (Note width/air temp.)
9) Special Features (Cribbing, New Maint. Repair)



Crack Severity Range / Definition

≤ 0.50 mm	= Hairline
> 0.50 mm to ≤ 1.50 mm	= Minor
> 1.50 mm to ≤ 3.00 mm	= Moderate
> 3.00 mm	= Severe

SUPERSTRUCTURE DESIGN TYPES

UPDATED: 10/31/2019

NBI ITEM 43

Item 43A - Materials

Code	
1	Concrete
2	Concrete continuous
3	Steel
4	Steel continuous
5	Prestressed concrete
6	Prestressed concrete continuous
7	Wood or Timber
8	Masonry
9	Aluminum, Wrought Iron, or Cast Iron
0	Other

Item 43B - Design Types

Code	
01	Slab
02	Stringer/Multi-beam or Girder
03	Girder and Floorbeam System
04	Tee Beam
05	Box Beam or Girders - Multiple
06	Box Beam or Girders - Single or Spread
07	Frame (except frame culverts)
08	Orthotropic
09	Truss - Deck
10	Truss - Thru
11	Arch - Deck
12	Arch - Thru
13	Suspension
14	Stayed Girder
15	Movable - Lift
16	Movable - Bascule
17	Movable - Swing
18	Tunnel
19	Culvert (includes frame culverts)
20	Mixed types
21	Segmental Box Girder
22	Channel Beam
00	Other

ITEM 43A	ITEM 43B	CODE	STRUCTURE TYPE DESCRIPTION
1	01	RCSS	Reinforced Concrete Slab, Simple
1	01	RISS	Reinforced Concrete Illinois Bulletin Slab, Simple
1	02	RBMP	Reinforced Concrete Beam, Encased
1	02	RTGS	Reinforced Concrete Through Girder, Simple
1	02	YBMS	Precast Reinforced Concrete Beam, Simple
1	03	RTGP	Reinforced Concrete Through Girder, Encased
1	04	RDGS	Reinforced Concrete Deck T-Girder, Simple
1	05	RBGS	Reinforced Concrete Box Girder, Simple
1	11	RFAF	Reinforced Concrete Filled Spandrel Arch, Fixed
1	11	ROAF	Reinforced Concrete Open Spandrel Arch, Fixed
1	12	RTAF	Reinforced Concrete Through Arch, Fixed
1	12	RTAT	Reinforced Concrete Through Arch, Tied
1	19	RAR	Reinforced Concrete Arch
1	19	RCB	Reinforced Concrete Box Culvert
1	19	RFB	Reinforced Concrete Rigid Frame Box Culvert
1	19	RMP	Reinforced Concrete Pipe
1	19	RRF	Reinforced Concrete Rigid Frame Culvert (No floor)
1	19	YAR	Precast, Reinforced Concrete Arch
1	19	YCB	Precast, Reinforced Concrete Box Culvert
1	19	YFB	Precast, Reinforced Concrete Rigid Frame Box Culvert
1	22	YBMS	Precast Reinforced Concrete Channel Beam, Simple
2	01	RCSC	Reinforced Concrete Slab, Continuous
2	01	RCSD	Reinforced Concrete Slab, Continuous and Drop-Panel
2	01	RCSH	Reinforced Concrete Slab, Continuous and Parabolic Haunch
2	01	RCSL	Reinforced Concrete Slab, Continuous and Linear Haunch
2	01	RCSR	Reinforced Concrete Slab, Continuous and Circular Haunch
2	01	RISC	Reinforced Concrete Illinois Bulletin Slab, Continuous
2	01	RISD	Reinforced Concrete Illinois Bulletin Slab, Continuous and Drop-Panel
2	01	RVSC	Reinforced Concrete Voided Slab, Continuous
2	01	RVSH	Reinforced Concrete Voided Slab, Continuous and Haunched
2	02	RBMP	Reinforced Concrete Beam, Encased and Continuous
2	02	RTGC	Reinforced Concrete Through Girder, Continuous
2	03	RSGC	Reinforced Concrete Girder Stringer Floorbeam, Continuous
2	03	RSGH	Reinforced Concrete Girder Stringer Floorbeam, Continuous and Haunched
2	04	RDGC	Reinforced Concrete Deck T-Girder, Continuous
2	04	RDGD	Reinforced Concrete Deck T-Girder, Continuous and Drop-Panel
2	04	RDGH	Reinforced Concrete Deck T-Girder, Continuous and Parabolic Haunched
2	04	RDGL	Reinforced Concrete Deck T-Girder, Continuous and Linear Haunch
2	04	RDGR	Reinforced Concrete Deck T-Girder, Continuous and Circular Haunch
2	05	RBGC	Reinforced Concrete Box Girder, Composite and Continuous
2	11	RARC	Reinforced Concrete Arch, Continuous
3	02	SBMS	Steel Beam, Simple
3	02	SMCS	Steel Beam, Composite and Simple
3	02	SRGS	Steel Rivet Plate Girder, Simple
3	02	STGS	Steel Through Girder, Simple
3	02	SWCS	Steel Welded Plate Girder, Composite and Simple
3	02	SWGS	Steel Welded Plate Girder, Simple
3	02	WBMS	Weathering Steel Beam, Simple
3	02	WMCS	Weathering Steel Beam, Composite and Simple
3	03	SFGS	Steel Girder Floorbeam, Simple
3	03	SSGS	Steel Girder Stringer Floorbeam, Simple
3	05	SBGS	Steel Box Girder, Simple
3	09	SDTS	Steel Deck Truss, Simple
3	10	SHTS	Steel High Truss, Simple
3	10	SLTS	Steel Low Truss, Simple
3	10	WLTS	Weathering Steel Low Truss, Simple
3	11	SOAF	Steel Open Spandrel Arch, Fixed
3	12	STAF	Steel Through Arch, Fixed
3	12	STAT	Steel Through Arch, Tied
3	19	CAR	Corrugated Metal Arch (Concrete Footings)
3	19	CLP	Corrugated Metal Long Span Pipe (Elliptical Bolted Structural Plate Sections)
3	19	CMP	Corrugated Metal Pipe (Round or Elliptical)
3	19	CSP	Corrugated Metal Structural Plate Pipe (Round Bolted Structural Plate Sections)
3	19	SAR	Steel Arch
3	19	SMP	Steel Pipe
4	02	SBMC	Steel Beam, Continuous
4	02	SMCC	Steel Beam, Composite and Continuous
4	02	SRGC	Steel Rivet Plate Girder, Continuous
4	02	SRGH	Steel Rivet Plate Girder, Continuous and Haunched
4	02	STGC	Steel Through Girder, Continuous
4	02	SWCC	Steel Welded Plate Girder, Composite and Continuous
4	02	SWCH	Steel Welded Plate Girder, Composite, Continuous and Haunched
4	02	SWGC	Steel Welded Plate Girder, Continuous
4	02	SWGH	Steel Welded Plate Girder, Continuous and Haunched
4	02	WBMC	Weathering Steel Beam, Continuous
4	02	WMCC	Weathering Steel Beam, Composite and Continuous
4	02	WWCC	Weathering Steel Welded Plate Girder, Composite and Continuous
4	02	WWCH	Weathering Steel Welded Plate Girder, Composite, Continuous and Haunched
4	02	WWGC	Weathering Steel Welded Plate Girder, Continuous
4	02	WWGH	Weathering Steel Welded Plate Girder, Continuous and Haunched
4	03	SFCC	Steel Girder Floorbeam System, Composite and Continuous
4	03	SFGC	Steel Girder Floorbeam, Continuous
4	03	SSCC	Steel, Girder Stringer Floorbeam, Composite and Continuous
4	03	SSGC	Steel Girder Stringer Floorbeam, Continuous
4	03	SSGH	Steel Girder Stringer Floorbeam, Continuous and Haunched
4	04	SDGC	Steel Deck T-Girder, Continuous
4	05	SBCC	Steel Box Girder, Composite and Continuous (Multiple)
4	05	SBGC	Steel Box Girder, Continuous
4	05	WBCC	Weathering Steel Box Girder, Composite and Continuous (Multiple)
4	06	SBCC	Steel Box Girder, Composite and Continuous (Single or Spread)
4	06	WBCC	Weathering Steel Box Girder, Composite and Continuous (Single or Spread)
4	07	SRFC	Steel Rigid Frame, Composite and Continuous
4	09	SDTC	Steel Deck Truss, Continuous
4	09	SDTH	Steel Deck Truss, Continuous and Haunched
4	10	SHTC	Steel High Truss, Continuous
4	10	SLTC	Steel Low Truss, Continuous
5	02	PBMS	Prestressed Concrete Beam, Simple
5	04	PDGS	Prestressed Concrete Deck Girder, Simple
5	04	PITS	Prestressed Concrete Inverted T-Girder Simple
5	05	PBGS	Prestressed Concrete Box Girder, Simple
5	05	XBGS	Post-Tensioned Box Girder, Simple
6	01	PVSC	Prestressed Concrete Voided Slab, Continuous
6	01	XCSH	Reinforced Concrete Slab, Post-Tensioned, Continuous and Parabolic Haunched
6	02	PBMC	Prestressed Concrete Beam, Continuous
6	04	PDGC	Prestressed Concrete Deck T-Girder, Continuous
6	04	PITC	Prestressed Concrete Inverted T-Girder Continuous
6	05	XBGC	Reinforced Concrete Box Girder, Post-Tensioned, Composite, and Continuous
7	01	TSSC	Timber Structural Slab, Continuous
7	01	TSSS	Timber Structural Slab, Simple
7	02	TBMC	Timber Beam, Continuous
7	02	TBMS	Timber Beam, Simple
8	11	MFAF	Stone Masonry Filled Spandrel Arch, Fixed
8	19	MAR	Stone Masonry Arch
9	19	AAR	Aluminum Arch

SUPERSTRUCTURE DESIGN TYPE ITEMS

Materials

Code		Code	
S	Steel	R	Reinforced Concrete
W	Weathering Steel	P	Prestressed Concrete
C	Corrugated Metal	L	Lightweight Concrete
I	Wrought Iron	X	Post-Tensioned
A	Aluminum	Y	Precast
T	Timber	M	Stone Masonry

Superstructure Types

Code		Code	
CS	Slab	IT	Inverted Tee Beam
IS	Illinois Bulletin Slab	BG	Box Girder
SS	Structural Slab	BC	Box Girder, Composite Design
VS	Voided Slab	RF	Rigid Frame
TG	Through Girder	GC	Rigid Frame, Composite Design
RG	Riveted Plate Girder	DG	Deck T-Girder or Orthotropic
RC	Riveted Plate Girder, Composite Design	DT	Deck Truss
WG	Welded Plate Girder	HT	High Truss
WC	Welded Plate Girder, Composite Design	LT	Low Truss
FG	Girder-Floorbeam System	AR	Arch
FC	Girder-Floorbeam System, Composite Design	FA	Filled Spandrel Arch
SG	Girder-Floorbeam-Stringer System	OA	Open Spandrel Arch
SC	Girder-Floorbeam-Stringer, Composite Design	TA	Through Arch
BM	Beam	CB	Box Culvert
MC	Beam, Composite Design	FB	Rigid Frame Box
		MP	Pipe
		LP	Long Span Pipe
		SP	Structural Plate Pipe

Design Features

Code		Code	
S	Simple	D	Continuous and Drop-Panel
C	Continuous	L	Continuous and Linear Haunched
H	Continuous and Parabolic Haunched	R	Continuous and Circular Haunched
P	Encased		
F	Fixed		
T	Tied		

Appendix

G

NBIS CODE OF FEDERAL REGULATIONS, 23 CFR 650, SUBPART C

Subpart C
National Bridge Inspection Standards

SOURCE: 69 FR 74436, Dec. 14, 2004, unless otherwise noted.
Electronic Code of Federal Regulations current as of December 6, 2013
www.ecfr.gov

§650.301 Purpose.

This subpart sets the national standards for the proper safety inspection and evaluation of all highway bridges in accordance with **23 U.S.C. 151**.

§650.303 Applicability.

The National Bridge Inspection Standards (NBIS) in this subpart apply to all structures defined as highway bridges located on all public roads.

§650.305 Definitions.

Terms used in this subpart are defined as follows:

American Association of State Highway and Transportation Officials (AASHTO) Manual. "The Manual for Bridge Evaluation," First Edition, 2008, published by the American Association of State Highway and Transportation Officials (incorporated by reference, *see* **§650.317**).

Bridge. A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

Bridge inspection experience. Active participation in bridge inspections in accordance with the NBIS, in either a field inspection, supervisory, or management role. A combination of bridge design, bridge maintenance, bridge construction and bridge inspection experience, with the predominant amount in bridge inspection, is acceptable.

Bridge inspection refresher training. The National Highway Institute "Bridge Inspection Refresher Training Course"[1] or other State, local, or federally developed instruction aimed to improve quality of inspections, introduce new techniques, and maintain the consistency of the inspection program.

[1]The National Highway Institute training may be found at the following URL: ***http://www.nhi.fhwa.dot.gov./***

Bridge Inspector's Reference Manual (BIRM). A comprehensive FHWA manual on programs, procedures and techniques for inspecting and evaluating a variety of in-service highway bridges. This manual may be purchased from the U.S. Government Printing Office, Washington, DC 20402 and from National Technical Information Service, Springfield, Virginia 22161, and is available at the following URL: ***http://www.fhwa.dot.gov/bridge/bripub.htm*** .

Complex bridge. Movable, suspension, cable stayed, and other bridges with unusual characteristics.

Comprehensive bridge inspection training. Training that covers all aspects of bridge inspection and enables inspectors to relate conditions observed on a bridge to established criteria (see the Bridge Inspector's Reference Manual for the recommended material to be covered in a comprehensive training course).

Critical finding. A structural or safety related deficiency that requires immediate follow-up inspection or action.

Damage inspection. This is an unscheduled inspection to assess structural damage resulting from environmental factors or human actions.

Fracture critical member (FCM). A steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse.

Fracture critical member inspection. A hands-on inspection of a fracture critical member or member components that may include visual and other nondestructive evaluation.

Hands-on. Inspection within arms length of the component. Inspection uses visual techniques that may be supplemented by nondestructive testing.

Highway. The term "highway" is defined in **23 U.S.C. 101(a)(11).**

In-depth inspection. A close-up, inspection of one or more members above or below the water level to identify any deficiencies not readily detectable using routine inspection procedures; hands-on inspection may be necessary at some locations.

Initial inspection. The first inspection of a bridge as it becomes a part of the bridge file to provide all Structure Inventory and Appraisal (SI&A) data and other relevant data and to determine baseline structural conditions.

Legal load. The maximum legal load for each vehicle configuration permitted by law for the State in which the bridge is located.

Load rating. The determination of the live load carrying capacity of a bridge using bridge plans and supplemented by information gathered from a field inspection.

National Institute for Certification in Engineering Technologies (NICET). The NICET provides nationally applicable voluntary certification programs covering several broad engineering technology fields and a number of specialized subfields. For information on the NICET program certification contact: National Institute for Certification in Engineering Technologies, 1420 King Street, Alexandria, VA 22314-2794.

Operating rating. The maximum permissible live load to which the structure may be subjected for the load configuration used in the rating.

Professional engineer (PE). An individual, who has fulfilled education and experience requirements and passed rigorous exams that, under State licensure laws, permits them to offer engineering services directly to the public. Engineering licensure laws vary from State to State, but, in general, to become a PE an individual must be a graduate of an engineering program accredited by the Accreditation Board for Engineering and Technology, pass the Fundamentals of Engineering exam, gain four years of experience working under a PE, and pass the Principles of Practice of Engineering exam.

Program manager. The individual in charge of the program, that has been assigned or delegated the duties and responsibilities for bridge inspection, reporting, and inventory. The program manager provides overall leadership and is available to inspection team leaders to provide guidance.

Public road. The term "public road" is defined in **23 U.S.C. 101(a)(27).**

Quality assurance (QA). The use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program.

Quality control (QC). Procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level.

Routine inspection. Regularly scheduled inspection consisting of observations and/or measurements needed to determine the physical and functional condition of the bridge, to identify any changes from initial or previously recorded conditions, and to ensure that the structure continues to satisfy present service requirements.

Routine permit load. A live load, which has a gross weight, axle weight or distance between axles not conforming with State statutes for legally configured vehicles, authorized for unlimited trips over an extended period of time to move alongside other heavy vehicles on a regular basis.

Scour. Erosion of streambed or bank material due to flowing water; often considered as being localized around piers and abutments of bridges.

Scour critical bridge. A bridge with a foundation element that has been determined to be unstable for the observed or evaluated scour condition.

Special inspection. An inspection scheduled at the discretion of the bridge owner, used to monitor a particular known or suspected deficiency.

State transportation department. The term "State transportation department" is defined in **23 U.S.C. 101(a)(34).**

Team leader. Individual in charge of an inspection team responsible for planning, preparing, and performing field inspection of the bridge.

Underwater diver bridge inspection training. Training that covers all aspects of underwater bridge inspection and enables inspectors to relate the conditions of underwater bridge elements to established criteria (see the Bridge Inspector's Reference Manual section on underwater inspection

for the recommended material to be covered in an underwater diver bridge inspection training course).

Underwater inspection. Inspection of the underwater portion of a bridge substructure and the surrounding channel, which cannot be inspected visually at low water by wading or probing, generally requiring diving or other appropriate techniques.

[69 FR 74436, Dec. 14, 2004, as amended at 74 FR 68379, Dec. 24, 2009]

§650.307 Bridge inspection organization.

(a) Each State transportation department must inspect, or cause to be inspected, all highway bridges located on public roads that are fully or partially located within the State's boundaries, except for bridges that are owned by Federal agencies.

(b) Federal agencies must inspect, or cause to be inspected, all highway bridges located on public roads that are fully or partially located within the respective agency responsibility or jurisdiction.

(c) Each State transportation department or Federal agency must include a bridge inspection organization that is responsible for the following:

(1) Statewide or Federal agencywide bridge inspection policies and procedures, quality assurance and quality control, and preparation and maintenance of a bridge inventory.

(2) Bridge inspections, reports, load ratings and other requirements of these standards.

(d) Functions identified in paragraphs (c)(1) and (2) of this section may be delegated, but such delegation does not relieve the State transportation department or Federal agency of any of its responsibilities under this subpart.

(e) The State transportation department or Federal agency bridge inspection organization must have a program manager with the qualifications defined in **§650.309(a),** who has been delegated responsibility for paragraphs (c)(1) and (2) of this section.

§650.309 Qualifications of personnel.

(a) A program manager must, at a minimum:

(1) Be a registered professional engineer, or have ten years bridge inspection experience; and

(2) Successfully complete a Federal Highway Administration (FHWA) approved comprehensive bridge inspection training course.

(b) There are five ways to qualify as a team leader. A team leader must, at a minimum:

(1) Have the qualifications specified in paragraph (a) of this section; or

(2) Have five years bridge inspection experience and have successfully completed an FHWA approved comprehensive bridge inspection training course; or

(3) Be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer's program for National Certification in Engineering Technologies (NICET) and have successfully completed an FHWA approved comprehensive bridge inspection training course, or

(4) Have all of the following:

(i) A bachelor's degree in engineering from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology;

(ii) Successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals of Engineering examination;

(iii) Two years of bridge inspection experience; and

(iv) Successfully completed an FHWA approved comprehensive bridge inspection training course, or

(5) Have all of the following:

(i) An associate's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology;

(ii) Four years of bridge inspection experience; and

(iii) Successfully completed an FHWA approved comprehensive bridge inspection training course.

(c) The individual charged with the overall responsibility for load rating bridges must be a registered professional engineer.

(d) An underwater bridge inspection diver must complete an FHWA approved comprehensive bridge inspection training course or other FHWA approved underwater diver bridge inspection training course.

§650.311 Inspection frequency.

(a) *Routine inspections.* (1) Inspect each bridge at regular intervals not to exceed twenty-four months.

(2) Certain bridges require inspection at less than twenty-four-month intervals. Establish criteria to determine the level and frequency to which these bridges are inspected considering such factors as age, traffic characteristics, and known deficiencies.

(3) Certain bridges may be inspected at greater than twenty-four month intervals, not to exceed forty-eight-months, with written FHWA approval. This may be appropriate when past inspection findings and analysis justifies the increased inspection interval.

(b) *Underwater inspections.* (1) Inspect underwater structural elements at regular intervals not to exceed sixty months.

(2) Certain underwater structural elements require inspection at less than sixty-month intervals. Establish criteria to determine the level and frequency to which these members are inspected considering such factors as construction material, environment, age, scour characteristics, condition rating from past inspections and known deficiencies.

(3) Certain underwater structural elements may be inspected at greater than sixty-month intervals, not to exceed seventy-two months, with written FHWA approval. This may be appropriate when past inspection findings and analysis justifies the increased inspection interval.

(c) *Fracture critical member (FCM) inspections.* (1) Inspect FCMs at intervals not to exceed twenty-four months.

(2) Certain FCMs require inspection at less than twenty-four-month intervals. Establish criteria to determine the level and frequency to which these members are inspected considering such factors as age, traffic characteristics, and known deficiencies.

(d) Damage, in-depth, and special inspections. Establish criteria to determine the level and frequency of these inspections.

§650.313 Inspection procedures.

(a) Inspect each bridge in accordance with the inspection procedures in the AASHTO Manual (incorporated by reference, *see* **§650.317**).

(b) Provide at least one team leader, who meets the minimum qualifications stated in **§650.309**, at the bridge at all times during each initial, routine, in-depth, fracture critical member and underwater inspection.

(c) Rate each bridge as to its safe load-carrying capacity in accordance with the AASHTO Manual (incorporated by reference, *see* **§650.317**). Post or restrict the bridge in accordance with the AASHTO Manual or in accordance with State law, when the maximum unrestricted legal loads or State routine permit loads exceed that allowed under the operating rating or equivalent rating factor.

(d) Prepare bridge files as described in the AASHTO Manual (incorporated by reference, *see* **§650.317**). Maintain reports on the results of bridge inspections together with notations of any action taken to address the findings of such inspections. Maintain relevant maintenance and inspection data to allow assessment of current bridge condition. Record the findings and results of bridge inspections on standard State or Federal agency forms.

(e) Identify bridges with FCMs, bridges requiring underwater inspection, and bridges that are scour critical.

(1) Bridges with fracture critical members. In the inspection records, identify the location of FCMs and describe the FCM inspection frequency and procedures. Inspect FCMs according to these procedures.

(2) Bridges requiring underwater inspections. Identify the location of underwater elements and include a description of the underwater elements, the inspection frequency and the procedures in the inspection records for each bridge requiring underwater inspection. Inspect those elements requiring underwater inspections according to these procedures.

(3) Bridges that are scour critical. Prepare a plan of action to monitor known and potential deficiencies and to address critical findings. Monitor bridges that are scour critical in accordance with the plan.

(f) *Complex bridges.* Identify specialized inspection procedures, and additional inspector training and experience required to inspect complex bridges. Inspect complex bridges according to those procedures.

(g) *Quality control and quality assurance.* Assure systematic quality control (QC) and quality assurance (QA) procedures are used to maintain a high degree of accuracy and consistency in the inspection program. Include periodic field review of inspection teams, periodic bridge inspection refresher training for program managers and team leaders, and independent review of inspection reports and computations.

(h) *Follow-up on critical findings.* Establish a statewide or Federal agency wide procedure to assure that critical findings are addressed in a timely manner. Periodically notify the FHWA of the actions taken to resolve or monitor critical findings.

§650.315 Inventory.

(a) Each State or Federal agency must prepare and maintain an inventory of all bridges subject to the NBIS. Certain Structure Inventory and Appraisal (SI&A) data must be collected and retained by the State or Federal agency for collection by the FHWA as requested. A tabulation of this data is contained in the SI&A sheet distributed by the FHWA as part of the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges," (December 1995) together with subsequent interim changes or the most recent version. Report the data using FHWA established procedures as outlined in the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges."

(b) For routine, in-depth, fracture critical member, underwater, damage and special inspections enter the SI&A data into the State or Federal agency inventory within 90 days of the date of inspection for State or Federal agency bridges and within 180 days of the date of inspection for all other bridges.

(c) For existing bridge modifications that alter previously recorded data and for new bridges, enter the SI&A data into the State or Federal agency inventory within 90 days after the completion of the work for State or Federal agency bridges and within 180 days after the completion of the work for all other bridges.

(d) For changes in load restriction or closure status, enter the SI&A data into the State or Federal agency inventory within 90 days after the change in status of the structure for State or Federal agency bridges and within 180 days after the change in status of the structure for all other bridges.

§650.317 Reference manuals.

(a) The materials listed in this subpart are incorporated by reference in the corresponding sections noted. These incorporations by reference were approved by the Director of the Federal Register in accordance with **5 U.S.C. 552(a)** and **1 CFR part 51**. These materials are incorporated as they exist on the date of the approval, and notice of any change in these documents will be published in the FEDERAL REGISTER. The materials are available for purchase at the address listed below, and are available for inspection at the National Archives and Records Administration (NARA). These materials may also be reviewed at the Department of Transportation Library, 1200 New Jersey Avenue, SE., Washington, DC 20590, (202) 366-0761. For information on the availability of these materials at NARA call (202) 741-6030, or go to the following URL: ***http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*** . In the event there is a conflict between the standards in this subpart and any of these materials, the standards in this subpart will apply.

(b) The following materials are available for purchase from the American Association of State Highway and Transportation Officials, Suite 249, 444 N. Capitol Street, NW., Washington, DC 20001, (202) 624-5800. The materials may also be ordered via the AASHTO bookstore located at the following URL: *http://www.transportation.org*.

(1) The Manual for Bridge Evaluation, First Edition, 2008, AASHTO, incorporation by reference approved for **§§650.305** and **650.313**.

(2) [Reserved]

[74 FR 68379, Dec. 24, 2009]

REFERENCES

The procedures followed in this manual were derived from the following reference sources, current editions:

1. American Association of State Highway and Transportation Officials (AASHTO) The Manual for Bridge Evaluation

2. Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges

3. FHWA Bridge Inspector's Reference Manual

4. Report No. FHWA-IP-86-2, Culvert Inspection Manual

5. Report No. FHWA-IP-86-26, Inspection of Fracture Critical Bridge Members

6. Report No. FHWA-DP-80-1, Underwater Inspection of Bridges