BrM BRIDGE INSPECTION

FIELD MANUAL

FOR

OKLAHOMA BRIDGES

OKLAHOMA DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

APRIL 2022 EDITION

OKLAHOMA Transportation

BrM AASHTOWare Bridge Management AASHTO

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The following Appendices are found in the BrM Office Manual

FOREWORD

BrM Bridge Inspection Manual

For

Oklahoma Bridges

The BrM (formerly Pontis) Bridge Inspection Manual for Oklahoma is divided into three parts; a field manual, office manual and user manual. The field manual contains all information needed by a bridge inspection team leader to properly inspect a bridge per Oklahoma standards. The information contained in the office manual deals with functions normally performed in the office rather than out in the field, such as creating plans of action, sufficiency rating, error checking, invoicing and data submittal. However, the field manual will still be needed to supplement the office manual for BrM data entry. Single letter appendix references ('A') refer to appendices within the Field Manual, while double letter appendix references ('AA') refer to appendices within the Office Manual. The User Manual describes the various features of BrM which are applicable to the basic user. It describes how to log in and navigate around the various screens, how to manipulate the bridge lists with various filters and layouts, how to run reports, how to import and export bridges, etc.

These documents are designed to be used in conjunction with the latest revision of the FHWA document; Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges.

This revision to the BrM Bridge Inspection Manual conforms to AASHTO Manual for Bridge Element Inspection, First Edition, 2013 with 2015 Interim Changes.

Elements are identified within the field manual by one of three designations:

NBE – National Bridge Element. These elements represent the primary structural components of bridges and are necessary to determine the overall condition and safety of the primary load carrying members. They are of national concern for safety. They are federally required and are reported to the FHWA National Bridge Inventory each year.

BME – Bridge Management Element. Bridge Management Elements include components of bridges such as joints, wearing surfaces, protective coatings and approach slabs that are typically managed by agencies using Bridge Management Systems software. These are federally required elements but they are not used for national policy-making. Most BME elements are reported to the FHWA (only approach slab elements are not reported).

OE – Oklahoma Element. These are custom elements used only in Oklahoma and are for bridge maintenance and management purposes. They are not reported directly to the FHWA; however some are related to a parent NBE element. In this case, the element and condition state quantities will be added to those of the parent NBE element for the FHWA submittal. (For example, NBE element 107 (Open Girder/Beam) is the parent element to Oklahoma Element 865 (5 Ft. Open Girder Ends). The quantities for element 865 will be added to the quantities for element 107 when the data is submitted to the FHWA.)

All Oklahoma custom elements are numbered to avoid conflict with the NBE/BME element numbers. The Oklahoma elements are numbered according to the following plan:

800-899 = Deck, Superstructure and Substructure elements (NBE related)
900-949 = Other (Joint, Protective Coating, Wearing Surface) elements (BME related)
950-999 = Smart flags

OKLAHOMA BRIDGE ELEMENTS

DEFECT FLAGS

Defect flags will not be used by Oklahoma for bridge inspections. This section is provided for information only. The specific defects are built into the definitions for element condition states 1-4.

This section describes the AASHTO defined defects that may be observed for a specified element.

- Element defects are generally to be used when the element condition reaches Condition State 2 or lower and they act to breakdown the element condition into one or more specific observed problems.
- Defect flags are measured in the same units of measure as the element to which it is applied. Therefore it is possible that a defect for one element will be measured as 'Each', while the same defect used for another element will be measured in 'Linear Feet'.
- Multiple defects may be applied to the same element provided the defects apply to different parts of the element or the most severe condition of each defect would each be placed in different condition states. In the case of two defects applying to the same area of the element where each defect would be placed in the same condition state, the defect to be recorded is the more severe of the observed defects.
- In cases where the inspector identifies a condition not identified in the listed defect flags, the inspector should use the general language of the condition states to determine the appropriate condition and specify in the element notes the nature of the defect.
- Condition state 4 is not defined, except that it is more severe than the specific defects identified for condition states 1 through 3 and may require a structural review.

DEFECT FLAGS

Defect Name (Number)	Used To Report	Steel / Metal	Reinforced Concrete	Pre-Stressed Concrete	Timber	Masonry	Joints	Bearings	Wearing Surfaces	Steel Protective Coating
Corrosion (1000)	Corrosion of metal elements	X						X		
Cracking (1010)	Fatigue cracking in metal elements	X						X		
Connection (1020)	Connection distress in metal and timber elements	X			X					
Delamination/ Spall/ Patched Area (1080)	Spalls, delamination and patched areas in concrete and masonry elements		X	X		X				
Exposed Rebar (1090)	Exposed conventional reinforcing steel in reinforced and pre-stressed concrete elements		X	X						
Exposed Prestressing (1100)	Exposed Prestressing steel in concrete elements			X						
Cracking (PSC) (1110)	Cracking in prestressed concrete elements			X						
Efflorescence/ Rust Staining (1120)	Efflorescence/rust staining in concrete and masonry elements		X	X		X				
Cracking (RC) (1130)	Cracking in reinforced concrete elements		X							
Decay/ Section Loss (1140)	Decay/section loss in timber elements				X					
Check/Shake (1150)	Checks and shakes in timber elements				X					
Crack (Timber) (1160)	Cracks in timber elements				X					
Split/Delamination (Timber) (1170)	Splits/Delaminations in timber elements				X					
Abrasion/Wear (Timber) (1180)	Abrasion/wear in timber elements				X					
Abrasion/Wear (PSC/RC) (1190)	Abrasion/wear in pre-stressed/reinforced concrete elements		X	X						
Mortar Breakdown (Masonry) (1610)	Breakdown of masonry mortar between brick, block and stone					X				
Split/Spall (Masonry) (1620)	Splits or spalls in brick, block or stone					X				
Patched Area (Masonry) (1630)	Masonry patched areas					X				
Masonry Displacement (1640)	Displaced brick, block or stone					X				
Distortion (1900)	Distortion from the original line or grade of the element; used to capture all distortion regardless of cause	X	X	X	X	X	X	X		
Movement (2210)	Movement of bridge bearing elements							X		
Alignment (2220)	Alignment of bridge bearing elements							X		

DEFECT FLAGS

Defect Name (Number)	Used To Report	Steel / Metal	Reinforced Concrete	Pre-Stressed Concrete	Timber	Masonry	Joints	Bearings	Wearing Surfaces	Steel Protective Coatings
Bulging/Splitting/ Tearing (2230)	Bulging, splitting or tearing of elastomeric bearing elements							X		
Loss of Bearing Area (2240)	Loss of bearing area for bridge bearing elements							X		
Leakage (2310)	Leakage through or around sealed bridge joints						X			
Seal Adhesion (2320)	Loss of adhesion in sealed bridge joints						X			
Seal Damage (2330)	Damage to the rubber in bridge joint seals						X			
Seal Cracking (2340)	Cracking in the rubber in bridge joint seals						X			
Debris Impaction (2350)	Accumulation of debris in bridge joint seals that may or may not affect the performance of the joints						X			
Adjacent Deck or Header (2360)	Concrete deck damage in the area of the bridge joint						X			
Metal Deterioration or Damage (2370)	Metal damage or deterioration in the bridge joint						X			
Delamination/ Spall/ Patched Area/Pothole (Wearing Surfaces) (3210)	Spalls, Delaminations, patched areas and potholes in wearing surface elements								X	
Crack (Wearing Surfaces) (3220)	Cracking in wearing surface elements								X	
Effectiveness (Wearing Surfaces) (3230)	Loss of effectiveness in the protection provided to the deck by the wearing surface elements								X	
Chalking (Steel Protective Coatings) (3410)	Chalking in metal protective coatings									X
Peeling/Bubbling/ Cracking (Steel Protective Coatings) (3420)	Peeling, bubbling or cracking in metal protective coatings.									X
Oxide Film Degradation Color/Texture Adherence (Steel Protective Coatings) (3430)	Oxide film degradation of texture in metal protective coatings									X
Effectiveness (Steel Protective Coatings) (3440)	Loss of effectiveness of metal protective coatings									X
Settlement (4000)	Settlement in substructure elements	X	X	X	X	X				
Scour (6000)	Scour in substructure elements	X	X	X	X	X				
Damage (7000)	Impact damage	X	X	X	X	X	X	X	X	X

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OKLAHOMA BRIDGE ELEMENTS

DECKS / SLABS

A. The element quantity included will be the total square footage of the driving area (bridge length x curb-to-curb width). The deck area provided on the Inventory tab/Design screen will be total deck area (bridge length x out-to-out width).

B. If there are two different deck types on one bridge, assign two deck elements to the bridge, and code each type in the appropriate condition states. Specify the square feet of each deck type (curb-to-curb). There must be two or more spans in order to have more than one deck element. Provide a structure note indicating the bridge really does have two deck types to avoid confusion when the bridge inspection data or report is reviewed by other persons.

C. For RCB/Span Bridge Combinations code elements and NBI ratings for the worst structure.

REINFORCED CONCRETE DECK OR SLAB

012 Reinforced Concrete Deck (NBE) **SF**

Reinforced concrete bridge deck, regardless of the wearing surface or protection systems used. The quantity for this element should include the area of the deck from curb to curb including any median areas and accounting for any flares or ramps present.

038 Reinforced Concrete Slab (NBE) **SF**

Reinforced concrete bridge slab, regardless of the wearing surface or protection systems used. The quantity for this element should include the area of the deck/slab from curb to curb including any median areas and accounting for any flares or ramps present.

859 Soffit of Concrete Decks and Slabs (OE) **EA**

Address deck distresses through visual examination of the deck soffit (under surface). It is extremely valuable when the deck is covered with an overlay. All concrete decks and slabs have this element except when a stay-in-place form is present. However, a soffit and a stay-in-place form may both exist on a bridge. This rating includes the condition of the deck or slab fascia. (Coded 1 EA, Only one per bridge)

- Sidewalks are not considered in the deck or slab condition state. Use the BrM Inspection Notes field to describe sidewalk condition.
- Be careful when coding a deck or slab. The direction of the main flexural steel (larger rebar) is the defining property. If longitudinal with traffic it is a slab. If transverse with traffic it is a deck. Refer to plans, if available.
- The deck/slab element cannot be rated better than the soffit element (if it exists) when the wearing surface element (510) also exists. There is no relation between the deck/slab element and a stay-in-place form element.
- Do not code a soffit element for double T beams.
- Refer to Appendix A for additional comments.

Associated Oklahoma Items

211 Special Wearing Surface Protective System
228 Concrete Cover
246 Overlay Type and Thickness
247 Protective Systems
266 Riding Surface Roughness

Associated Elements

300-305, 905-909 Joints
510 Wearing Surfaces
890 Steel Stay-In-Place Form
891 P/S Concrete Stay-In-Place-Form
521 Concrete (Deck) Protective Coating

REINFORCED CONCRETE DECK OR SLAB

Condition States

The deck/slab or flange evaluation is three-dimensional in nature with the defects observed on the top surface, bottom surface, edges, or all; and being captured using the defined condition states. Deck/Slab or flange top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on nondestructive testing or indicators in the materials covering the surfaces.

- Patched areas are repaired areas that are expected to have less durability than the surrounding deck material and are considered temporary.
- The area of the distress controls the condition state, not the severity. Use notes to describe the severity.

Condition State 1

Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC) (1130) – Sealed crack width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (1190) – No abrasion or wearing

Condition State 2

Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC) (1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Condition State 3

Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC) (1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

PRESTRESSED CONCRETE DECK OR SLAB

015 Prestressed Concrete Top Flange (NBE) **SF**

Prestressed concrete bridge girder top flanges where traffic rides directly on the structural element, regardless of the wearing surface or protection systems used. These bridge types include bulb-tees, box girders and girders that require traffic to ride on the top flange. The quantity for this element should include the area of the top flange from curb to curb, including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.

843 Prestressed Concrete Slab (OE) **SF**

Prestressed concrete slabs with no surface protection. The quantity for this element should include the area of the slab from curb to curb.

859 Soffit of Concrete Decks and Slabs (OE) **EA**

Address deck distresses through visual examination of the deck soffit (under surface). It is extremely valuable when the deck is covered with an overlay. All concrete decks and slabs have this element except when a stay-in-place form is present. However, a soffit and a stay-in-place form may both exist on a bridge. This rating includes the condition of the deck or slab fascia. (Coded 1 EA, Only one per bridge)

- Sidewalks are not considered in the deck or slab condition state. Use the BrM Inspection Notes field to describe sidewalk condition.
- Be careful when coding a deck or slab. The direction of the main flexural steel (larger rebar) is the defining property. If longitudinal with traffic it is a slab. If transverse with traffic it is a deck. Refer to plans, if available.
- The deck/slab element cannot be rated better than the soffit element (if it exists) when the wearing surface element (510) also exists. There is no relation between the deck/slab element and a stay-in-place form element.
- Do not code a soffit element for double T beams.
- Refer to Appendix A for additional comments.

Associated Oklahoma Items

211 Special Wearing Surface Protective System
228 Concrete Cover
246 Overlay Type and Thickness
247 Protective Systems
266 Riding Surface Roughness

Associated Elements

300-305, 905-909 Joints
510 Wearing Surfaces
890 Steel Stay-In-Place Form
891 P/S Concrete Stay-In-Place-Form
521 Concrete (Deck) Protective Coating

PRESTRESSED CONCRETE DECK OR SLAB

Condition States

The deck/slab or flange evaluation is three-dimensional in nature with the defects observed on the top surface, bottom surface, edges, or all; and being captured using the defined condition states. Deck/slab or flange top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on nondestructive testing or indicators in the materials covering the surfaces.

- Patched areas are repaired areas that are expected to have less durability than the surrounding deck material and are considered temporary.
- The area of the distress controls the condition state, not the severity. Use notes to describe the severity.

Condition State 1

Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Exposed Prestressing (1100) – None
Cracking (PSC) (1110) - Width less than 0.004 in. or spacing greater than 3.0 ft.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Abrasion/Wear (1190) – No abrasion or wearing

Condition State 2

Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without measurable section loss.
Exposed Prestressing (1100) – Present without section loss.
Cracking (PSC) (1110) - Width 0.004-0.009 in. or spacing 1.0-3.0 ft.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Abrasion/Wear (1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Condition State 3

Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss but does not warrant structural review.
Exposed Prestressing (1100) – Present with section loss but does not warrant structural review.
Cracking (PSC) (1110) - Width greater than 0.009 in. or spacing of less than 1 ft.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Abrasion/Wear (1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

STEEL DECK

028 Steel Deck with Open Grid (NBE) **SF**

Defines all open grid steel bridge decks with no fill. The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any flares or ramps present.

030 Steel Deck Corrugated/Orthotropic/Etc. (NBE) **SF**

Bridge decks constructed of corrugated metal filled with Portland cement, asphaltic concrete, or other riding surfaces. Orthotropic steel decks are also included. Materials added for riding surface are not part of the element condition.

- Refer to Appendix A for additional comments.
- There may be more than one steel deck type on a bridge. Refer to Appendix B.

Associated Smart Flags

956 Steel Cracking/Fatigue
957 Pack Rust
963 Steel Section Loss

Associated Oklahoma Items

225 Paint Type and Overcoat System
226 Date Painted
227 Paint Color
266 Riding Surface Roughness

Associated Elements

300-305, 905-909 Joints
510 Wearing Surface

Inspector Comments

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STEEL DECK

Condition States

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states.

Condition State 1
Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.

Condition State 2
Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connections (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.

Condition State 3
Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connections (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

TIMBER DECK OR SLAB

031 Timber Deck (NBE) **SF**

Timber bridge deck, excluding runners, regardless of the wearing surface or protection systems used. The quantity for this element should include the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

054 Timber Slab (NBE) **SF**

Timber bridge slab, excluding runners, regardless of the wearing surface or protection systems used. The quantity for this element should include the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.

- If part of a board is rotten or broken, count the entire board area as deficient to determine the condition state.
- Timber running planks shall be included under the wearing surface assessment.
- Refer to Appendix A for additional comments.

Associated Oklahoma Items

246 Type of Overlay and Thickness
266 Riding Surface Roughness

Associated Elements

510 Wearing Surface

Inspector Comments

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_____

TIMBER DECK OR SLAB

Condition States

The deck/slab evaluation is three-dimensional in nature with the defects observed on the top and bottom surface, edges, or all; and being captured using the defined condition states.

Condition State 1

Connection (1020) – Connection is in place and functioning as intended.
Decay/Section Loss (1140) – None
Check/Shake (1150) – Surface penetration less than 5% of the member thickness regardless of location.
Cracks (1160) – None
Split/Delamination (1170) – None
Abrasion/Wear (1180) – None or no measurable section loss.

Condition State 2

Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Decay/Section Loss (1140) – Affects less than 10% of the member section.
Check/Shake (1150) – Penetrates 5%-50% of the thickness of the member and not in a tension zone.
Cracks (1160) – Crack that has been arrested through effective measures.
Split/Delamination (1170) – Length less than the member depth or arrested with effective actions taken to mitigate.
Abrasion/Wear (1180) –Section loss less than 10% of the member depth.

Condition State 3

Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.
Decay/Section Loss (1140) – Affects 10% or more of the member but does not warrant a structural review.
Check/Shake (1150) – Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.
Cracks (1160) – Identified crack that is not arrested, but does not warrant a structural review.
Split/Delamination (1170) – Length equal to or greater than the member depth but does not warrant structural review**.**
Abrasion/Wear (1180) –Section loss 10% or more of the member thickness but does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

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OKLAHOMA BRIDGE ELEMENTS

SUPERSTRUCTURE / SUBSTRUCTURE

STEEL TRUSS OR ARCH

120 Steel Truss (Pony) (NBE) **LF**

Defines all steel pony truss elements, including all tension and compression members, regardless of protective system. The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinal to the travel way. Observed distress in truss vertical or diagonal members shall be reported as the length projected along the length of the truss.

821 Steel Truss (Overhead) (OE) **LF**

Defines all steel overhead truss elements, including all tension and compression members, regardless of protective system. The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinal to the travel way. Observed distress in truss vertical or diagonal members shall be reported as the length projected along the length of the truss.

822 Steel Truss (Deck) (OE) **LF**

Defines all steel deck truss elements, including all tension and compression members, regardless of protective system. The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinal to the travel way.

141 Steel Arch (NBE) **LF**

Defines all steel arches, regardless of type or protective system. The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinal to the travel way.

162 Steel Gusset Plate (NBE) **EA**

Defines steel gusset plate(s) connections that are on the main truss/arch panel(s), regardless of protective systems. These connections can be constructed with one or more plates that may be bolted, riveted, or welded. The quantity for this element is the sum of the number of primary load path gusset plate assemblies. For multiple plate gusset connections at a single panel point, the quantity shall be one gusset plate regardless of the number of individual plates at the single connection point. For built up gusset plates, distress observed on any plate should be considered in the condition assessment.

- If an arch is under a fill, a deck element is not required. If the abutments are not visible due to siltation of the channel, do not code a substructure element. When a substructure element is coded, the element will be of the same material as the arch. (i.e., a reinforced concrete arch will have a reinforced concrete abutment).
- Refer to Appendix A for additional comments.

Associated Smart Flags

956 Steel Cracking/Fatigue
957 Pack Rust
962 Superstructure Traffic Impact
963 Steel Section Loss
964 Steel Out – of – Plane Compression Member
969 Out-of-Plane Distortion/Loading

Associated Elements

515 Steel (Superstructure) Protective Coating

Associated Oklahoma Items

248 No. Of Field Splices With Severe Corrosion

Inspector Comments

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_____
_____
_____

STEEL TRUSS OR ARCH

Condition States

It is not necessary to code condition state 2 for weathering steel when it is performing as desired.

Condition State 1
Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.
Distortion (1900) - None

Condition State 2
Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connections (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.

Condition State 3
Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connections (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

STEEL SUPERSTRUCTURE

102 Steel Closed Web/Box Girder (NBE) **LF**

Defines all steel box girders or closed web girders, regardless of protective system. The box girder is three-dimensional in nature, with the defects observed on exterior and interior surfaces being used to capture the condition states. The quantity is the sum of all the lengths of each box girder section.

107 Steel Open Girder/Beam (NBE) **LF**

Defines all steel open girders, regardless of protective system. The quantity is the sum of all the length of each girder minus the quantity for beam end and girder under construction joint elements. Condition evaluation for this element includes the web face and the top and bottom faces of the flange.

113 Steel Stringer (NBE) **LF**

Defines steel members that support the deck in a stringer floor beam system, regardless of protective system. The quantity is the sum of all the lengths of each stringer minus the quantity for the stringer end and stringer under construction joint elements. Condition evaluation for this element includes the web faces and the top and bottom faces of the flange.

152 Steel Floor beam (NBE) **LF**

Defines steel floor beams that typically support stringers, regardless of protective system. The quantity is the sum of all the lengths of each floor beam. Condition evaluation for this element includes the web faces and the top and bottom faces of the flange.

161 Steel Pin or Pin and Hanger Assembly (NBE) **EA**

Defines steel pin and pin and hanger assemblies, regardless of protective system. The quantity is the sum of the numbers of pins, pin and hanger assemblies, or both. Distress observed on either hanger assembly plate should be considered in the condition assessment.

832 Curved Girder Diaphragm/Cross-frame (OE) **EA**

Defines steel curved girder diaphragm/cross-frame members in a section of bent, curved or chorded steel girders within a superstructure regardless of protective system. Not applicable to diaphragms/cross-frames connected to a section of straight steel girders, even if on the same bridge as a curved girder. The quantity is the sum of the number of diaphragms/cross-frames present in the section of steel girder.

863 Steel Pier Beams (OE) **LF**

Defines all steel pier beams (which take the place of a reinforced concrete or timber pier cap), regardless of protective systems. A steel pier beam is part of the superstructure and is fracture critical.

865 Steel Open Girder Ends - (5 ft.) (OE) **LF**

Steel, open girder ends. The quantity will be equal to 5 linear feet at each end of a girder, except as specified in the notes, below.

872 Steel Girder Under Construction Joint (OE) **LF**

Girder units that are located beneath a construction joint. Do not use for construction joints with reinforcing steel through the joint. The quantity will be equal to 5 feet on each side of the construction joint.

877 Steel Stringer Ends - (5 ft.) (OE) **LF**

Steel, open stringer ends. The quantity will be equal to 5 linear feet at each end of a stringer, except as specified in the notes, below.

879 Steel Stringer Under Construction Joint (OE) **LF**

Stringer units, located beneath a construction joint. Do not use for construction joints with reinforcing steel through the joint. The quantity will be equal to 5 feet on each side of the construction joint.

- In the case of integral abutments, do not code the open girder end element (865).
- Do not use a 5 foot stringer/girder end element for timber or steel decks. Also, do not use at a pier where the deck was a continuous pour, or has reinforcing steel through a construction joint. If in doubt whether reinforcing steel is used in a construction joint over a pier, code element 865.
- Railroad flat cars used as bridge elements should be coded as girders.
- Refer to Appendix A for additional comments.

Associated Smart Flags

956 Steel Cracking/Fatigue
957 Pack Rust
962 Superstructure Traffic Impact
963 Steel Section Loss
969 Out-of-Plane Distortion/Loading
973 Horizontal Force
974 Straight Girder Diaphragm/Cross-frame

Associated Oklahoma Items

225 Paint Type and Overcoat System
226 Date Painted
227 Paint Color
248 No. Of Field Splices With severe Corrosion

Associated Elements

515 Steel (Superstructure) Protective Coating

STEEL SUPERSTRUCTURE

Condition States

- Minor corrosion along the edges of girders top flanges should not influence the condition state assignment.
- Code every horizontal foot for its worst condition state vertically.
- Do not include diaphragms in the condition state. However, their condition should be noted.
- It is not necessary to code condition state 2 for weathering steel when it is performing as desired.

Condition State 1

Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.
Distortion (1900) - None

Condition State 2

Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connections (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.

Condition State 3

Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connections (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

STEEL SUBSTRUCTURE

202 Steel Column (NBE) **EA**

Defines steel columns, regardless of protective system. The quantity is the sum of the number of columns.

207 Steel Towers (NBE) **LF**

Defines steel built up or framed tower supports, regardless of protective system. The quantity for this element is the sum of the heights of built up or framed tower supports.

219 Steel Abutment (NBE) **LF**

Defines steel abutments, regardless of protective system. This includes the sheet material retaining the embankment, and monolithic wingwalls and abutment extensions. The quantity is the sum of the width of the abutment with monolithic wingwalls and abutment extensions measured along the skew angle. Monolithic wingwalls, up to the first construction joint (sheet pile joint, etc.), shall be considered in the quantity and assessment of the abutment element. In the case of abutments where wingwalls have a 0 degree break, the abutment length will end at the deck overhang. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element.

225 Steel Pile (NBE) **EA**

Defines steel piles that are visible for inspection, regardless of protective system. This includes piles exposed from erosion or scour and piles visible during an underwater inspection. Also includes wing piles.

231 Steel Pier Cap (NBE) **LF**

Defines steel pier caps that support girders and transfer load into piles, regardless of protective system. The quantity for this element is the sum of the cap lengths measured along the skew angle.

871 Steel Wingwall (OE) **EA**

Defines steel wingwalls at all abutments and all RCBs, regardless of protective system. The quantity is the sum of the number of wingwalls.

- The routine bridge inspector will inspect only the above water portion of a submerged pile.
- The extent of an UW inspection will be from 15' above the waterline to the channel bottom.
- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- Whenever a column or piling is exposed at the abutment (by erosion or other cause), the quantity exposed needs to be added to the column or piling quantity of the bridge and inspected. (While exposed, it becomes more susceptible to deterioration and needs to be included in the deterioration and cost models.)
- Often times dumbbell type piers are miscoded as pierwalls. Please refer to Appendix B.
- Any abutment not fitting a specific material type should be assigned element 218.
- For all bridges over a waterway, items 60, 61 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix D for definitions of piles and columns.
- Refer to Appendix A for additional comments.

Associated Smart Flags

956 Steel Cracking/Fatigue
957 Pack Rust
967 Substructure Traffic Impact
963 Steel Section Loss
965 Debris
966 Exposed Abutment Piling
968 Erosion

Associated Oklahoma Items

225 Paint Type and Overcoat System
226 Date Painted
227 Paint Color

Associated Elements

918 Steel (Substructure) Protective Coating

STEEL SUBSTRUCTURE

Condition States

- For elements 202 and 225 code the individual column or pile for its worst condition state.
- For elements 219 and 231 code every foot of element for its worst condition state.
- For element 871 code severity of deterioration at wingwall connection.
- It is not necessary to code condition state 2 for weathering steel when it is performing as desired.

Condition State 1

Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.
Distortion (1900) - None
Settlement (4000) **(NA to element 231)** - None
Scour (6000) **(NA to element 231)** - None
Wingwall (element 871) only - wing wall connection is in good condition.

Condition State 2

Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connections (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Settlement (4000) **(NA to element 231)** – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) **(NA to element 231)** – Exists within tolerable limits or has been arrested with effective countermeasures.
Wingwall (element 871) only - Severe deterioration of the integral wingwall connection. Wing does not allow fill material to spill through. Non-integral wings may show some separation from abutment or construction material has begun to deteriorate.

Condition State 3

Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connections (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Settlement (4000) **(NA to element 231)** – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) **(NA to element 231)** – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.
Wingwall (element 871) only - Open cracks between integral wingwalls and the abutment/culvert. Some fill material may spill out through wingwall. Non-integral wingwalls showing moderate separation from abutment/culvert or moderate deterioration of construction material.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Wingwall (element 871) only – Integral wingwall is totally separated from abutment or culvert. A significant amount of fill material is spilling through wingwall. Non-integral wing significantly separated from abutment/culvert or severe deterioration of construction material.

REINFORCED CONCRETE
Superstructure

105 Reinforced Concrete Closed Web/Box Girder (NBE) **LF**

Defines a reinforced concrete box girder or closed web girder, regardless of the protective system. The quantity for this element is the sum of all the lengths of each girder.

110 Reinforced Concrete Open Girder/Beam (NBE) **LF**

Defines mild steel reinforced concrete open web girders, regardless of protective system. The quantity for this element is the sum of all of the lengths of each girder. This can also include deck girders, T-girders and through girders. Condition evaluation for this element includes the web faces and the top and bottom flange surfaces.

116 Reinforced Concrete Stringer (Stringer - FloorBeam System) (NBE) **LF**

Defines mild steel reinforced concrete members that support the deck in a stringer floor beam system, regardless of protective system. The quantity for this element is the sum of all of the lengths of each stringer.

144 Reinforced Concrete Arch (Without Fill)(NBE) **LF**

Defines only spandrel arches and/or arches having bridge decks, regardless of protective system. The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinal to the travel way. Observed distress in arch diagonals, vertical members (including spandrel columns) and spandrel walls shall be reported as the projected length along the arch length. The length below the spring line is considered substructure.

844 Reinforced Concrete Arch (With Fill)(OE) **LF**

Defines arches with fill, regardless of protective system. The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinal to the travel way from spring line to spring line. The length below the spring line is considered substructure.

155 Reinforced Concrete Floor Beam (Stringer - FloorBeam System) (NBE) **LF**

Defines only mild steel reinforced concrete floor beams that typically support stringers, regardless of protective system. The quantity for this element is the sum of all of the lengths of each floor beam.

814 Concrete Encased Steel Girder (OE) **LF**

Defines concrete encased steel I-beam. (Typically just one span over a railroad crossing.)

- If a concrete arch is under fill code as either element 841 or 844, as appropriate. When a substructure element is coded, the element will be of the same material as the arch. (i.e., a reinforced concrete arch will have a reinforced concrete abutment).
- Refer to Appendix A for additional comments.
- No 5 ft. beam end element was created for reinforced concrete open girder/beams since it was felt these beams did not present a problem under joints.
- Any diagonal cracks emanating from a support are structural and must be reported to the Program Manager.

Associated Smart Flags

962 Superstructure Traffic Impact
965 Debris (Arch only)
966 Exposed Abutment Piling (Arch only)
971 Fiber Reinf. Polymer (FRP) Repair

Associated Elements

922 Concrete (Superstructure) Protective Coating
841 Precast Concrete Arch Culvert

REINFORCED CONCRETE
Superstructure
Condition States

- For elements 105, 110, 116, 144 and 155 code each horizontal foot for its worst condition state vertically.
- Do not include diaphragms in the condition state. However, their condition should be noted.
- Shear cracks emanate from support.

Condition State 1
Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (RC)(1190)(Element 144 only) – No abrasion or wearing

Condition State 2
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC)(1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (RC)(1190)(Element 144 only) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Condition State 3
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC)(1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (RC)(1190)(Element 144 only) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

REINFORCED CONCRETE
Substructure (page 1 of 2)

205 Reinforced Concrete Column (NBE) **EA**

Defines reinforced columns, regardless of protective system. The quantity for this element is the sum of the number of columns.

210 Reinforced Concrete Pier Wall (NBE) **LF**

Defines reinforced concrete pier walls, regardless of protective systems. The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle.

220 Reinforced Concrete Pile Cap/Footing (NBE) **LF**

Defines reinforced concrete pile cap/footings that are visible for inspection, including pile caps/footings exposed from erosion or scour or visible during an underwater inspection. The exposure may be intentional or caused by erosion or scour. The quantity of this element is the sum of the length of footings or pile caps along the skew angle.

227 Reinforced Concrete Pile (NBE) **EA**

Defines reinforced concrete piles that are visible for inspection, regardless of protective system. Includes piles exposed from erosion or scour and piles visible during an underwater inspection. The quantity for this element is the sum of the number of piles visible for inspection. Also includes wing piles.

234 Reinforced Concrete Pier Cap (NBE) **LF**

Defines reinforced concrete caps that support girders and transfers load into piles or columns, regardless of protective system. The quantity for this element is the sum of the cap length measured along the skew angle.

- The routine bridge inspector will inspect only the above water portion of a submerged pile.
- The extent of an UW inspection will be from 15' above the waterline to the channel bottom.
- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- Whenever a column or piling is exposed at the abutment (by erosion or other cause), the quantity exposed needs to be added to the column or piling quantity of the bridge and inspected. (While exposed, it becomes more susceptible to deterioration and needs to be included in the deterioration and cost models.)
- Oftentimes dumbbell type piers are miscoded as pierwalls. Please refer to Appendix B.
- For all bridges over a waterway, items 60, 61 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix D for definitions of piles, columns and pierwalls.
- Refer to Appendix A for additional comments.

Associated Smart Flags

960 Settlement
965 Debris
967 Substructure Traffic Impact
971 Fiber Reinf. Polymer (FRP) Repair

Associated Elements

923 Concrete (Substructure) Protective Coating

Inspectors Notes

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REINFORCED CONCRETE
Substructure
Condition States

- For elements 205, 220 and 227 code the individual column or pile for its worst condition state.
- For elements 210 and 234 code every foot of element for its worst condition state.
- Shear cracks emanate from support.

Condition State 1

Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (RC)(1190)(N/A to element 234) – No abrasion or wearing.
Settlement (4000)(N/A to element 234) – None
Scour (6000)(N/A to element 234) – None

Condition State 2

Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC)(1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (RC)(1190)(N/A to element 234) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.
Settlement (4000)(N/A to element 234) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000)(N/A to element 234) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC)(1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (RC)(1190)(N/A to element 234) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
Settlement (4000)(N/A to element 234) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000)(N/A to element 234) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

REINFORCED CONCRETE
Substructure (page 2 of 2)

215 Reinforced Concrete Abutment (NBE) **LF**

Defines reinforced concrete abutments, regardless of protective system. This includes the material retaining the embankment and monolithic wingwalls and abutment extensions. The quantity is the sum of the width of the abutment with monolithic wingwalls and abutment extensions measured along the skew angle. Monolithic wingwalls, up to the first construction joint (cold joint, water stop, etc.), shall be considered in the quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element. In the case of abutments where wingwalls have a 0 degree break, the abutment length will end at the deck overhang. (Measured along the face of the abutment to each wing wall break) slopewalls and backwalls are not considered in the abutment condition state. Use the BrM Inspection Notes field to describe the slopewall and backwall condition. The appropriate 5 ft. beam end element is required with this element.

818 Integral Abutment (OE) **LF**

Abutments constructed of reinforced concrete. An additional pour after the beams are set in place encapsulates the beam ends into the abutment backwall. (Measured along the face of the abutment to each wing wall break.) Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element. In the case of abutments where wingwalls have a 0 degree break, the abutment length will end at the deck overhang. Slopewalls and backwalls are not considered in the abutment condition state. Use the BrM Inspection Notes field to describe the slopewall and backwall condition. A 5 ft. beam end element is not required with this element. Do not code bearing element for integral abutments.

870 Reinforced Concrete Wingwall (OE) **EA**

Defines reinforced concrete wingwalls at all abutments and all RCBs, regardless of protective system. The quantity is the sum of the number of wingwalls.

- In the case of integral abutments, do not code the open girder end element (865/819).
- The extent of an UW inspection will be from 15' above the waterline to the channel bottom.
- Bearing assembly anchor rods alone can't make a substructure less than a '5' for substructure rating.

Associated Smart Flags

960 Settlement
965 Debris
966 Exposed Abutment Piling
968 Erosion

Associated Elements

923 Concrete (Substructure) Protective Coating

Inspectors Notes

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REINFORCED CONCRETE
Substructure
Condition States

- For elements 215 and 818 code every foot of element for its worst condition state.
- For element 870 code severity of deterioration at wingwall connection in addition to the other defects listed.

Condition State 1

Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (RC)(1190) – No abrasion or wearing.
Settlement (4000) – None
Scour (6000) – None
Wingwall (element 870) only - wing wall connection is in good condition.

Condition State 2

Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC)(1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (RC)(1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.
Wingwall (element 870) only - Severe (about 1/4") cracking, spalling, or deterioration of the integral wingwall connection. Wing does not allow fill material to spill through. May have some reinforcing steel exposed. Non-integral wings may show some separation from abutment or construction material has begun to deteriorate.

Condition State 3

Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC)(1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (RC)(1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.
Wingwall (element 870) only - Open cracks between integral wingwalls and the abutment/culvert. Some fill material may spill out through wingwall. Non-integral wingwalls showing moderate separation from abutment/culvert or moderate deterioration of construction material.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Wingwall (element 870) only – Integral wingwall is totally separated from abutment or culvert. A significant amount of fill material is spilling through wingwall. Non-integral wing significantly separated from abutment/culvert or severe deterioration of construction material.

PRESTRESSED CONCRETE
Superstructure

104 Prestressed Concrete Closed Web/Box Girder (NBE) **LF**

Defines all pre-tensioned or post-tensioned concrete closed web/box girders, regardless of protective system. The quantity for this element is the number of girders multiplied by the span length.

109 Prestressed Concrete Open Girder/Beam (NBE) **LF**

Defines pre-tensioned or post-tensioned concrete open girders, regardless of protective system. The quantity will be equal to the sum of all lengths of each girder minus 5 feet for each girder end and 5 feet on each side of a construction joint (when applicable). Where traffic rides directly on the structural element, regardless of the wearing surface, evaluation of the top flange above the fillet is considered with element 15.

819 Prestressed Concrete Open Girder/Beam Ends (5 ft.) (OE) **LF**

Open girder ends that are constructed of prestressed concrete. The quantity will be equal to 5 linear feet at each end of a girder except as specified in the notes, below. Reinforced concrete end caps and linkage blocks, if they exist, are included in the 5' beam ends. Note whether damage is to precast or cast-in-place portion (e.g., 90% cast-in-place and 10% precast). Don't code beam ends for integral abutments.

864 Post Tensioned Concrete Pier Beams (OE) **LF**

Takes the place of a pier cap but is considered part of the superstructure. A post-tensioned pier beam is not considered fracture critical.

873 Prestressed Concrete Girder Under Construction Joint (OE) **LF**

Girder units that are constructed of prestressed concrete, located beneath a construction joint. Do not use for construction joints with reinforcing bar through the joint. The quantity will be equal to 5 feet on each side of the construction joint.

- The reference for element 819 recommendations is NCHRP Report 654 "Evaluation and Repair Procedures for Precast/Prestressed Concrete Girders with Longitudinal Cracking in the Web".
- Do not use element 819 at a pier where the deck was a continuous pour or has reinforcing steel through a construction joint. If in doubt as to whether reinforcing steel is used in a construction joint over a pier, code element 819.
- Do not code a soffit element for double T beams.
- Refer to Appendix A for additional comments.

Associated Smart Flags

962 Superstructure Traffic Impact
971 Fiber Reinf. Polymer (FRP) Repair

Associated Elements

922 Concrete (Superstructure) Protective Coating

	5' Precast Beam Ends (Crack Width = 'W') Element 819 Only	**Post Tensioned Pier Beam * Prestressed Conc. Open Girder/ Beam**
CS 1	W < 0.012 in.	W < 0.004 in.
CS 2	>= 0.012 in. and < 0.025 in.	0.004 in. <= W <= 0.009 in.
CS 3	>= 0.025 in. and < 0.050 in.	W > 0.009 in.
CS 4	> 0.050 in.	Beyond Limits of CS 3

Table A: Crack Width Comparison * Excludes linkage blocks

PRESTRESSED CONCRETE
Superstructure
Condition States

- For elements 104, 109 and 819 code every foot of element for its worst condition state.
- Shear cracks emanate from support.

Condition State 1
Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Exposed Prestressing (1100) – None
Cracking (PSC)(1110) – Refer to Table A, page 28.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None

Condition State 2
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without measurable section loss.
Exposed Prestressing (1100) – Present without section loss.
Cracking (PSC)(1110) - Refer to Table A, page 28.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.

Condition State 3
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss but does not warrant structural review.
Exposed Prestressing (1100) – Present with section loss but does not warrant structural review.
Cracking (PSC)(1110) - Refer to Table A, page 28.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

PRESTRESSED CONCRETE
Substructure

204 Prestressed Concrete Column (NBE) **EA**

Defines all prestressed concrete columns, regardless of protective system. The quantity is the sum of the number of columns.

226 Prestressed Concrete Pile (NBE) **EA**

Defines all prestressed concrete piles that are visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection, regardless of protective system. The quantity is the sum of the number of piles visible for inspection. Also includes wing piles.

233 Prestressed Concrete Pier Cap (NBE) **LF**

Defines prestressed concrete pier caps that support girders and transfer load into piles or columns, regardless of protective system. The quantity for this element is the sum of the cap lengths measured along the skew angle.

- The extent of an UW inspection will be from 15' above the waterline to the channel bottom.
- Refer to Appendix A for addition comments.

Associated Smart Flags

960 Settlement
962 Superstructure Traffic Impact
967 Substructure Traffic Impact
968 Erosion
971 Fiber Reinf. Polymer (FRP) Repair

Associated Elements

923 Concrete (Substructure) Protective Coating

Inspectors Notes

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PRESTRESSED CONCRETE
Substructure
Condition States

- For element 204 code the individual column or pile for its worst condition state.
- For element 233 code every foot of element for its worst condition state.
- Shear cracks emanate from support.

Condition State 1

Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Exposed Prestressing (1100) – None
Cracking (PSC)(1110) - Refer to Table A, page 28.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Abrasion/Wear (1190)(NA to element 233) – No abrasion or wearing
Settlement (4000) (NA to element 233) – None
Scour (6000) (NA to element 233) – None

Condition State 2

Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without measurable section loss.
Exposed Prestressing (1100) – Present without section loss.
Cracking (PSC)(1110) - Refer to Table A, page 28.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Abrasion/Wear (1190) (NA to element 233) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.
Settlement (4000) (NA to element 233) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) (NA to element 233) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss but does not warrant structural review.
Exposed Prestressing (1100) – Present with section loss but does not warrant structural review.
Cracking (PSC)(1110) - Refer to Table A, page 28.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Abrasion/Wear (1190) (NA to element 233) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
Settlement (4000) (NA to element 233) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) (NA to element 233) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

TIMBER

Superstructure

111 Timber Open Girder/Beam (NBE) **LF**

Defines all timber open girders, regardless of protection system. The quantity for this element is the sum of all the lengths of each girder/beam.

117 Timber Stringer (NBE) **LF**

Defines timber members that support the deck in a stringer floor beam system, regardless of protective system. The quantity for this element is the sum of all of the lengths of each stringer.

Associated Smart Flags

962 Superstructure Traffic Impact

Substructure

206 Timber Column (NBE) **EA**

Defines all timber columns regardless of protective system. The quantity of this element is the sum of the number of columns.

212 Timber Pier Wall (NBE) **LF**

Defines timber pier walls that include pile, timber sheet material, and filler, regardless of protective system. The quantity for this element is the sum of the length of the pier walls measured along the skew angle.

216 Timber Abutment (NBE) **LF**

Defines timber abutments, regardless of protective system. This includes the material retaining the embankment, wingwalls, and abutment extensions. The quantity for this element is the sum of the width of the abutment with wingwalls and abutment extensions measured along the skew angle. Monolithic wingwalls, up to the first construction joint (plank but joint, etc.) shall be considered in the quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element.

228 Timber Pile (NBE) **EA**

Defines timber piles that are visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection, regardless of protective system. A submerged pile is one that is normally covered by at least 5'-0" of water at normal flow. The quantity for this element is the sum of the number of submerged piles visible for inspection. Also includes wing piles.

235 Timber Pier Cap (NBE) **LF**

Defines timber pier caps that support girders that transfer load into piles or columns, regardless of protective system. The quantity for this element is the sum of the pier cap lengths measured along the skew angle.

874 Timber Wingwall (OE) **EA**

Defines timber wingwalls at all abutments, regardless of protective system. The quantity is the sum of the number of wingwalls.

- The routine bridge inspector will inspect only the above water portion of a submerged pile.
- The extent of an UW inspection will be from 15’ above the waterline to the channel bottom.
- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- When determining the elements for timber and other combination abutments, the piling, cap, and backwall will be coded separately. The backwall will be coded as the abutment.
- For all bridges over a waterway, items 60, 61 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix D for definitions of piles, columns and pierwalls.
- Refer to Appendix A for additional comments.

Associated Smart Flags

965 Debris
966 Exposed Abutment Piling
967 Substructure Traffic Impact
968 Erosion
971 Fiber Reinf. Polymer Repair

TIMBER
Superstructure
Condition States

- For elements 206 and 228 code the individual column or pile for its worst condition state.
- For elements 111, 117, 216 and 235 code every foot of element for its worst condition state.
- Do not include diaphragms in the condition state. However their condition should be noted.

*The below definitions for scour and settlement do not apply to elements 111, 117 and 235

Condition State 1

Connection (1020) – Connection is in place and functioning as intended.
Decay/Section Loss (1140) – None.
Check/Shake (1150) – Surface penetration less than 5% of the member thickness regardless of location.
Cracks (1160) – None.
Split/Delamination (1170) – None.
Abrasion/Wear (1180) – None or no measurable section loss.
Settlement (4000) – None.
Scour (6000) – None

Condition State 2

Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Decay/Section Loss (1140) – Affects less than 10% of the member section.
Check/Shake (1150) – Penetrates 5%-50% of the thickness of the member and not in a tension zone.
Cracks (1160) – Crack that has been arrested through effective measures.
Split/Delamination (1170) – Length less than the member depth or arrested with effective actions taken to mitigate.
Abrasion/Wear (1180) –Section loss less than 10% of the member depth.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.
Decay/Section Loss (1140) – Affects 10% or more of the member but does not warrant a structural review.
Check/Shake (1150) – Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.
Cracks (1160) – Identified crack that is not arrested, but does not warrant a structural review.
Split/Delamination (1170) – Length equal to or greater than the member depth but does not warrant structural review**.**
Abrasion/Wear (1180) –Section loss 10% or more of the member thickness but does not warrant structural review.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

MASONRY
Superstructure

145 Masonry Arch (NBE) **LF**

Defines masonry or stacked stone arches, regardless of protective system. The quantity for this element is the sum of all of the lengths of each arch section measured longitudinally along the travel way. Observed distress in arch spandrel walls shall be reported as the projected length along the arch length. For filled arches, the arch quantity shall be measured from spring line to spring line. The length below the spring line is considered substructure.

- If an arch is under a fill, a deck element is not required. If the abutments are not visible due to siltation of the channel, do not code a substructure element. When a substructure element is coded, the element will be of the same material as the arch. (i.e., a reinforced concrete arch will have a reinforced concrete abutment).
- Refer to Appendix A for additional comments.

Associated Smart Flags

962 Superstructure Traffic Impact
965 Debris
966 Exposed Abutment Piling

Substructure

213 Masonry Pier Wall (NBE) **LF**

Defines pier wall constructed of block or stone, regardless of protective system. The block or stone may be placed with or without mortar. The quantity for this element is the sum of the wall lengths measured along the skew.

217 Masonry Abutment (NBE) **LF**

Defines abutments constructed of block or stone, including integral wingwalls and abutment extensions, regardless of protective system. The block or stone may be placed with or without mortar. The quantity for this element is the sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle. Integral wingwalls, up to the first construction joint (cold joint, water stop, etc.) shall be considered in the quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element.

875 Masonry Wingwall (OE) **EA**

Defines masonry wingwalls at all abutments and all RCBs, regardless of protective system. The quantity is the sum of the number of wingwalls.

- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- For all bridges over a waterway, items 60, 61 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix A for additional comments.

Associated Smart Flags

960 Settlement
967 Substructure Traffic Impact
965 Debris
966 Exposed Abutment Piling
968 Erosion

MASONRY
Superstructure/Substructure
Condition States

*The below definitions for scour and settlement do not apply to element #145

Condition State 1
Efflorescence/Rust Staining (1120) – None
Mortar Breakdown (Masonry) (1610) – None
Split/Spall (Masonry) (1620) – None
Patched Area (Masonry) (1630) – None
Masonry Displacement (1640) – None
Settlement (4000) – None
Scour (6000) – None

Condition State 2
Efflorescence/Rust Staining (1120) – Surface white without build-up or leaching without rust staining.
Mortar Breakdown (Masonry) (1610) – Cracking or voids in less than 10% of joints.
Split/Spall (Masonry) (1620) – Block or stone has split or spalled with no shifting.
Patched Area (Masonry) (1630) – Sound patch
Masonry Displacement (1640) – Block or stone has shifted slightly out of alignment.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3
Efflorescence/Rust Staining (1120) – Heavy build-up with rust staining.
Mortar Breakdown (Masonry) (1610) – Cracking or voids in 10% or more of the joints.
Split/Spall (Masonry) (1620) – Block or stone has split or spalled with shifting but does not warrant a structural review.
Patched Area (Masonry) (1630) – Unsound patch.
Masonry Displacement (1640) – Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

OTHER MATERIALS

211 Other Material Pier Wall (NBE) **LF**

Defines pier walls constructed of other materials, regardless of protective systems. The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle.

218 Other Material Abutment (NBE) **LF**

Defines other material abutments systems, regardless of protective system. This includes the sheet material retaining the embankment, wingwalls, and abutment extensions. The quantity of this element is the sum of the lengths of the abutments measured along the skew angle.

892 Geo-Synthetic Reinforced Soil (GRS) Abutment **LF**

Defines abutments constructed of geo-synthetically reinforced materials, including, but not limited to, soil and gravel.

- Any pier wall not fitting a specific material type should be assigned element 211.
- Any abutment not fitting a specific material type should be assigned element 218.

Associated Smart Flags

967 Substructure Traffic Impact
965 Debris
966 Exposed Abutment Piling
968 Erosion

Inspectors Notes

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OTHER MATERIALS

Condition States

Condition State 1
Condition – Good condition (No notable distress)
Scour - None
Settlement - None

Condition State 2
Condition – Fair condition (Isolated breakdown or deterioration)
Scour – Arrestment or countermeasures exist, or both
Settlement - Arrestment or countermeasures exist, or both

Condition State 3
Condition – Poor condition (Widespread deterioration or breakdown without reducing load capacity)
Scour - Minor
Settlement - Minor

Condition State 4
The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.

CULVERT

Steel

240 Steel Culvert (NBE) **LF**

Defines steel culverts, including arched, round, or elliptical pipes. The quantity for this element is the flow line length of the barrel times the number of barrels. The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- Culverts are measured from outside of headwall to outside of headwall for each barrel and include any length caused by skew.
- Do not assign a soffit smart flag on culverts.
- For all bridges over a waterway, items 61, 62 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix A for additional comments.

Associated Smart Flags

957 Pack Rust
965 Debris
968 Erosion

Associated Oklahoma Items

222 Fill over RCB

Inspectors Notes

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CULVERT
Steel
Condition States

Condition State 1

Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.
Distortion (1900) - None
Settlement (4000) - None
Scour (6000) - None

Condition State 2

Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connections (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connections (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

CULVERT

Concrete

241 Reinforced Concrete Culvert (NBE) **LF**

Defines reinforced concrete culverts, including box, arched, round, or elliptical shapes. The quantity for this element is the flow line length of the barrel times the number of the barrels.

841 Precast Concrete Arch Culvert (OE) **LF**

Defines precast concrete arch culverts under fill. The quantity for this element is the flow line length of the arch barrel times the number of the barrels.

912 Culvert Construction Joint (OE) **EA**

Defines construction joints in concrete culverts or precast concrete arch culverts where rebar was not continuous at the joint. The quantity for this element is one each per construction joint per barrel.

- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- Culverts are measured from outside of headwall to outside of headwall for each barrel and include any length caused by skew.
- Do not assign a soffit smart flag on culverts.
- For all bridges over a waterway, items 61, 62 and 113 should be coded appropriately. Refer to Appendix C.
- Railings on RCBs are coded only if they are attached to the box.
- Culvert headwalls are coded as railing only if it is greater than 27 inches tall.
- Refer to Appendix A for additional comments.

Associated Elements

510 Wearing Surfaces (At Grade Culverts only, zero ft. of fill)

Associated Smart Flags

960 Settlement
965 Debris
968 Erosion

Associated Oklahoma Items

222 Fill over RCB

Inspector's Notes

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CULVERT
Concrete
Condition States

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Condition State 1

Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (RC)(1190) - No abrasion or wearing.
Distortion (1900) – None
Settlement (4000) – None
Scour (6000) – None

Condition State 2

Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC)(1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (RC)(1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.
Distortion (1900) – See Smart Flag 960 for Settlement/Distortion.
Settlement (4000) – See Smart Flag 960 for Settlement/Distortion.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC)(1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (RC)(1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
Distortion (1900) – See Smart Flag 960 for Settlement/Distortion.
Settlement (4000) – See Smart Flag 960 for Settlement/Distortion.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

CULVERT

Timber

242 Timber Culvert (NBE) **LF**

Defines all timber culverts, regardless of protection system. The quantity of this element is the flow line length of the barrel times the number of barrels. The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- Culverts are measured from outside of headwall to outside of headwall for each barrel and include any length caused by skew.
- Do not assign a soffit smart flag on culverts.
- For all bridges over a waterway, items 61, 62 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix A for additional comments.

Associated Smart Flags

965	Debris
968	Erosion
971	Fiber Reinf. Polymer (FRP) Repair

Inspector's Notes

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CULVERT
Timber
Condition States

Condition State 1

Connection (1020) – Connection is in place and functioning as intended.
Decay/Section Loss (1140) – None.
Check/Shake (1150) – Surface penetration less than 5% of the member thickness regardless of location.
Cracks (1160) – None.
Split/Delamination (1170) – None.
Abrasion/Wear (1180) – None or no measurable section loss.
Distortion (1900) – None.
Settlement (4000) – None.
Scour (6000) – None

Condition State 2

Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Decay/Section Loss (1140) – Affects less than 10% of the member section.
Check/Shake (1150) – Penetrates 5%-50% of the thickness of the member and not in a tension zone.
Cracks (1160) – Crack that has been arrested through effective measures.
Split/Delamination (1170) – Length less than the member depth or arrested with effective actions taken to mitigate.
Abrasion/Wear (1180) –Section loss less than 10% of the member depth.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.
Decay/Section Loss (1140) – Affects 10% or more of the member but does not warrant a structural review.
Check/Shake (1150) – Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.
Cracks (1160) – Identified crack that is not arrested, but does not warrant a structural review.
Split/Delamination (1170) – Length equal to or greater than the member depth but does not warrant structural review**.**
Abrasion/Wear (1180) –Section loss 10% or more of the member thickness but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

CULVERT
Other

243 Other Material Culvert (NBE) **LF**

Defines other material type culverts, including arches, round, or elliptical pipes. These culverts are not included in steel, concrete, or timber material types. The quantity is the Flowline length of the barrel times the number of barrels.

- Submerged elements where the water depth exceeds 5'-0" during the normal low water flow are for underwater inspections only. If the substructure elements are submerged with water depths exceeding 5'-0" during the normal low water flow, it is recommended that you contact the Bridge Division to determine if this location can be added to the underwater inspection list. The Bridge Division especially desires to identify locations where the exposed pile was caused by scour or degradation.
- Culverts are measured from outside of headwall to outside of headwall for each barrel and include any length caused by skew.
- Do not assign a soffit smart flag on culverts.
- Do not code slab spans supported by masonry substructure as masonry box culverts. Code as slab, piers, and abutments.
- For all bridges over a waterway, items 61, 62 and 113 should be coded appropriately. Refer to Appendix C.
- Refer to Appendix A for additional comments.

Associated Smart Flags

965 Debris
968 Erosion

Associated Oklahoma Items

222 Fill over RCB

Inspector's Notes

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CULVERT
Other
Condition States

The distortion defect is contingent on a number of factors; such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Condition State 1

Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.
Delamination/Spall/Patched Area (1080) – None
Efflorescence/Rust Staining (1120) – None
Cracking (RC and Other) (1130) – Width less than 0.012 in. or spacing greater than 3.0 ft.
Deterioration (Other) (1220) - None
Distortion (1900) - None
Settlement (4000) - None
Scour (6000) - None

Condition State 2

Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connections (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Delamination/Spall/Patched Area (1080) – Delamination. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Efflorescence/Rust Staining (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC and Other) (1130) – Width 0.012-0.05 in. or spacing of 1.0-3.0 ft.
Deterioration (Other) (1220) – Initiated breakdown or deterioration.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connections (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. in diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Efflorescence/Rust Staining (1120) – Heavy build-up without rust staining.
Cracking (RC and Other) (1130) – Width greater than 0.05 in. or spacing of less than 1.0 ft.
Deterioration (Other) (1220) – Significant deterioration or breakdown but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

CULVERT
Masonry

244 Masonry Culvert (NBE) **LF**

Defines masonry block or stone culverts. The quantity is the flow line length of the barrel times the number of barrels.

Associated Smart Flags

965 Debris
968 Erosion

Condition States

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Condition State 1

Efflorescence/Rust Staining (1120) – None
Mortar Breakdown (Masonry) (1610) – None
Split/Spall (Masonry) (1620) – None
Patched Area (Masonry) (1630) – None
Masonry Displacement (1640) – None
Distortion (1900) – None
Settlement (4000) – None
Scour (6000) – None

Condition State 2

Efflorescence/Rust Staining (1120) – Surface white without build-up or leaching without rust staining.
Mortar Breakdown (Masonry) (1610) – Cracking or voids in less than 10% of joints.
Split/Spall (Masonry) (1620) – Block or stone has split or spalled with no shifting.
Patched Area (Masonry) (1630) – Sound patch
Masonry Displacement (1640) – Block or stone has shifted slightly out of alignment.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Settlement (4000) – Exists within tolerable limits or arrested with no observed structural distress.
Scour (6000) – Exists within tolerable limits or has been arrested with effective countermeasures.

Condition State 3

Efflorescence/Rust Staining (1120) – Heavy build-up with rust staining.
Mortar Breakdown (Masonry) (1610) – Cracking or voids in 10% or more of the joints.
Split/Spall (Masonry) (1620) – Block or stone has split or spalled with shifting but does not warrant a structural review.
Patched Area (Masonry) (1630) – Unsound patch.
Masonry Displacement (1640) – Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Settlement (4000) – Exceeds tolerable limits but does not warrant structural review.
Scour (6000) – Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.

Condition State 4

For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

OKLAHOMA BRIDGE ELEMENTS

OTHER

(JOINTS/BEARINGS/APPROACH SLABS/ RAILINGS/STAY-IN-PLACE FORMS)

JOINTS

300 Strip Seal Expansion Joint (BME) **LF**
Defines expansion joint devices which utilize a neoprene type waterproof gland with some type of metal extrusion or other system to anchor the gland.

301 Pourable Joint With Seal (Expansion) (BME) **LF**
Defines joints filled with a pourable seal with or without a backer.

302 Compression Joint Seal (BME) **LF**
Defines joints filled with a preformed compression type seal. This joint may or may not have an anchor system to confine the seal.

303 Assembly Joint With Seal (BME) **LF**
Defines joints filled with an assembly mechanism that has a seal.

304 Open Expansion Joint (BME) **LF**
Defines joints that are open and not sealed. Intended for joints designed as open joints and sliding plate joints; not for those joints that were designed to have a seal that is currently missing.

305 Assembly Joint Without Seal (BME) **LF**
Defines assembly joints that are open and not sealed, including finger joints. Includes open joints with or without a drainage trough below the joint.

905 Steel Reinforced Joint Seal (OE) **LF**
Defines steel reinforced joints (Waboflex, General Tire, etc.)

906 Sealed Expansion Joint (SEJ-3) (OE) **LF**
Defines expansion joint devices SEJ-3.

907 Steel Finger Joint (SED-2) (OE) **LF**
Defines steel finger joints.

908 Aluminum Finger Joint (CIPEC) (OE) **LF**
Defines aluminum finger joints.

909 Pourable Fixed Joint Seal or Open Joints With No Device (OE) **LF**
Full-depth deck/construction fixed joints (at panel points or fixed abutments). This is to include joint filler material such as fabric, etc. (Typically less than 1" width.)

910 Preformed Silicone Joint (OE) **LF**
Defines joints with a preformed silicone insert.

911 Preformed Silicone Compression Joint (OE) **LF**
Defines joints with a preformed silicone compression insert.

- The quantity for all joint elements is the sum of the lengths of the joint measured along the skew angle.
- Leaking construction joints commonly cause concrete deterioration where pieces of concrete can fall from the soffit. Whenever deck or soffit concrete has spalled, condition state 3 must be used, even if the joint has been sealed. Refer to CX follow up recommendation description in Appendix E. The approach slab or roadway surface adjacent to the bridge may be of any material, including gravel.
- Rate an entire joint in a single condition state. Separate joints may be rated in separate condition states.
- If the joint is covered by asphalt and cannot be inspected and there is no indication of the joint's condition, it shall be coded with 100% in condition state 2.
- If a deck feature is behaving as a joint, then code it as a joint.
- Refer to Appendix A for additional comments.
- Refer to Appendix B for joint sketches and photos.

JOINTS

Condition States

Condition State 1
Leakage (2310)(NA to 304, 305) – None
Seal adhesion (2320)(NA to 304, 305) – Fully adhered.
Seal Damage (2330)(NA to 304, 305) – None
Seal Cracking (2340)(NA to 304, 305) – None
Debris Impaction (2350) – No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.
Adjacent Deck or Header (2360) – Sound. No spall, delamination or unsound patch.
Metal Deterioration or Damage (2370)(NA to 301, 302, 304) – None

Condition State 2
Leakage (2310)(NA to 304, 305) – Minimal. Minor dripping through the joint.
Seal adhesion (2320)(NA to 304, 305) – Adhered for more than 50% of the joint height.
Seal Damage (2330)(NA to 304, 305) – Seal abrasion without punctures.
Seal Cracking (2340)(NA to 304, 305) – Surface crack.
Debris Impaction (2350) – Partially filled with hard-packed material but still allowing free movement.
Adjacent Deck or Header (2360) – Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.
Metal Deterioration or Damage (2370)(NA to 301, 302, 304) – Freckled rust; metal has no cracks or impact damage. Connection may be loose but functioning as intended.

Condition State 3
Leakage (2310)(NA to 304, 305) – Moderate. More than a drip and less than free flow of water.
Seal adhesion (2320)(NA to 304, 305) – Adhered 50% or less of the joint height but still some adhesion.
Seal Damage (2330)(NA to 304, 305) – Punctured or ripped or partially pulled out.
Seal Cracking (2340)(NA to 304, 305) – Crack that partially penetrates the seal.
Debris Impaction (2350) – Completely filled and impacts joint movement.
Adjacent Deck or Header (2360) – Spall greater than 1 in. deep or greater than 6 in. in diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.
Metal Deterioration or Damage (2370)(NA to 301, 302, 304) – Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning.

Condition State 4
Leakage (2310)(NA to 304, 305) – Free flow of water through the joint.
Seal adhesion (2320)(NA to 304, 305) – Compete loss of adhesion.
Seal Damage (2330)(NA to 304, 305) – Punctured completely through, pulled out or missing.
Seal Cracking (2340)(NA to 304, 305) – Crack that fully penetrates the seal.
Debris Impaction (2350) – Completely filled and prevents joint movement.
Adjacent Deck or Header (2360) – Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.
Metal Deterioration or Damage (2370)(NA to 301, 302, 304) – Metal cracking, section loss, damage, or connection failure that prevents the joint from functioning as intended.

BEARINGS

310 Elastomeric Bearing Pad (NBE) **EA**

Defines bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement. The quantity is the sum of each bearing of this type. Includes both fixed and moveable neoprene bearing pads. When 310 exists without 916, include an element note to this effect.

311 Moveable Bearing (Roller, Sliding, Rockers, Etc.) (NBE) **EA**

Defines bridge bearings which provide for both rotation and longitudinal movement by means of roller, rocker, or sliding mechanisms. The quantity is the sum of each bearing of this type. Plate and Cast Iron bearing shoes are difficult to tell which are expansion and which are fixed. Count the total number of bearings and assign half to both the moveable (311) and fixed (313) bearing elements.

313 Fixed Bearing (NBE) **EA**

Defines bridge bearings that provide for rotation only (no longitudinal movement). The quantity is the sum of each bearing of this type. Plate and Cast Iron bearing shoes are difficult to tell which are expansion and which are fixed. Count the total number of bearings and assign half to both the moveable (311) and fixed (313) bearings elements. When girders on the main span are supporting girders from the approach span on steel angle iron, code the angles irons as Fixed (313) Bearings.

314 Pot Bearing (NBE) **EA**

Defines high load bearings with confined elastomer. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction. The quantity is the sum of each bearing of this type. (There are not many in Oklahoma.)

916 Steel Bearing Assembly (OE) **EA**

Includes all bearing assembly items for an elastomeric bearing such as steel plates and mounting bolts and excluding the primary elastomeric neoprene pad. Includes both slotted and un-slotted bearing devices. The quantity is the sum of each bearing assembly of this type. Bearing assemblies alone can't make a substructure less than a '5' for substructure rating.

- Elements 310 and 916 are frequently used together, although one may exist without the other.
- Refer to Appendix A for additional comments.
- Refer to page B12 for alignment tolerances.

Associated Smart Flags

972 Loss of Bearing
963 Steel Section Loss
973 Horizontal Force

Inspector Comments

_____
_____
_____
_____
_____

BEARINGS

Condition States

Condition State 1
Corrosion (1000) - None
Connection (1020) – Connection is in place and functioning as intended.
Movement (2210) – Free to move.
Alignment (2220) – Lateral and vertical alignment is as expected for the temperature conditions.
Bulging, Splitting or Tearing (2230)(Elements 310/314 only) - None
Loss of Bearing Area (2240) - None

Feasible Actions - Do Nothing/Protect

Condition State 2
Corrosion (1000) – Freckled rust. Corrosion of the steel has initiated.
Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Movement (2210) – Minor restriction.
Alignment (2220) – Tolerable lateral and vertical alignment that is inconsistent with the temperature conditions.
Bulging, Splitting or Tearing (2230)(Elements 310/314 only) – Bulging less than 15% of the thickness.
Loss of Bearing Area (2240) – See Smart Flag 972 for Loss of Bearing.

Feasible Actions - Do Nothing/Protect/Repair

Condition State 3
Corrosion (1000) – Section loss is evident or pack rust is present but does not warrant structural review.
Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Movement (2210) – Restricted but not warranting structural review.
Alignment (2220) – Approaching the limits of lateral or vertical alignment for the bearing but does not warrant structural review.
Bulging, Splitting or Tearing (2230)(Elements 310/314 only) – Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.
Loss of Bearing Area (2240) – See Smart Flag 972 for Loss of Bearing.

Feasible Actions - Do Nothing/Protect/Repair

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
For element 916 only - There is greater than 33% section loss or anchor bolt failure at any part of the steel assembly or loose bolts regardless of steel condition.

Feasible Actions - Do nothing/Protect/Repair/Rehabilitate/Replace

APPROACH SLABS

321 Reinforced Concrete Approach Slab (BME) **EA**

Defines structural sections between the abutment and the approach pavement that are constructed of mild steel reinforced concrete. The quantity for this element is the sum of the number of approach slabs.

- Refer to Appendix A for additional comments.

Associated Oklahoma Item Which Must Be Verified:

223 Approach Roadway Condition
266 Riding Surface Roughness

APPROACH SLABS

Condition States

Condition State 1
Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (RC)(1190) – No abrasion or wearing
Settlement (4000) – None

Condition State 2
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Cracking (RC)(1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (RC)(1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.
Settlement (4000) – Settlement less than or equal to 1" exists or has been arrested with no observed structural distress.

Condition State 3
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Cracking (RC)(1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (RC)(1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
Settlement (4000) – Settlement greater than 1" and less than or equal to 2" exists but does not warrant structural review.

Condition State 4
For all defects – Settlement greater than 2" exists. The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

RAILING

330 Metal Bridge Railing (NBE) **LF**

All types and shapes of metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. will all be considered part of this element. All elements of the railing must be metal. The quantity for this element includes the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge. The number of rows of rail on a bridge is commonly two, one on each side of the traveled way. In some cases, there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lanes. Refer to the other bridge rail elements (concrete, timber, masonry, other) for specific defects for assessing the condition of posts, blocking and curbs that may be constructed of materials other than metal.

- When the rail is in good shape, but the anchorage or the deck it is attached to is in poor condition requires your judgment. If it is just an anchorage problem and can be resolved by replacing anchor devices, then the railing needs to be down-rated. However, if the soffit has deteriorated to the degree that it cannot support an anchorage system; code the condition of the railing as if the anchors are in good condition and note the deficiency in the comment section of the report.
- Define where the end of a railing is, such as when a concrete railing continues to the end of the approach slab. For consistency with the metal flexbeam that continues to the termination point, just consider the railing from end of bridge to end of bridge for quantifying the LF.
- If a railing is obsolete and coded as not meeting current standard in item 36, then it will be the inspector's responsibility to estimate whether they believe we will continue to maintain the railing in its current form when it becomes damaged. If we will continue to maintain the rail, it makes sense to continue capturing the railing's condition. Otherwise, the railing should not be evaluated.
- Refer to Appendix B for sketches of acceptable and unacceptable traffic rails for item 36. The sketches may be misleading. It seems the railing is obsolete if the curb width is any wider than 9". This is not true. If the railing is 42" higher than the sidewalk it may be acceptable. We don't think we have any of these, but we will address them in a case-by-case situation if they exist.
- When there is traffic impact damage to bridge railing, do not code the Traffic Impact Smart Flag. Instead, code the failed section of the traffic railing in the worst condition state.
- Railings on an RCB are coded only if they are attached to the box.
- Refer to Appendix A for additional comments.

Associated Element

919 Steel Railing Protective Coating

Associated Oklahoma Items

204 Type of Railing

RAILING

Condition States

If the offset between the curb and the rail is two inches or less, then include the condition of the curb in the rail condition rating. Defects in yellow apply to curb only.

Condition State 1 **Feasible Actions -** Do nothing/Protect
Corrosion (1000) – None
Cracking (1010) - None
Connection (1020) – Connection is in place and functioning as intended.
Distortion (1900) - None
Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC) (1130) – Sealed crack width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (1190) – No abrasion or wearing

Condition State 2 **Feasible Actions -** Do nothing/Protect/Repair
Corrosion (1000) – Freckled rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.
Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC) (1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Condition State 3 **Feasible Actions -** Do nothing/Protect/Repair/Rehabilitate/Replace
Corrosion (1000) – Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant a structural review.
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC) (1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Condition State 4 **Feasible Actions -** Do nothing/Protect/Repair/Rehabilitate/Replace
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

RAILING

331 Reinforced Concrete Bridge Railing (NBE) **LF**

All types and shapes of reinforced concrete bridge railing. All elements of the railing must be concrete. Quantity is the number of rows of bridge rail times the length of the bridge. The element quantity includes the rail on the bridge. The number of rows of rail on a bridge is commonly two, one on each side of the travelled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lanes.

- When the rail is in good shape, but the anchorage or the deck it is attached to is in poor condition requires your judgment. If it is just an anchorage problem and can be resolved by replacing anchor devices, then the railing needs to be down- rated. However, if the soffit has deteriorated to the degree that it cannot support an anchorage system; code the condition of the railing as if the anchors are in good condition and note the deficiency in the comment section of the report.
- Define where the end of a railing is, such as when a concrete railing continues to the end of the approach slab. For consistency with the metal flexbeam that continues to the termination point, just consider the railing from end of bridge to end of bridge for quantifying the LF.
- If a railing is obsolete and coded as not meeting current standard in item 36, then it will be the inspector's responsibility to estimate whether they believe we will continue to maintain the railing in its current form when it becomes damaged. If we will continue to maintain the rail, it makes sense to continue capturing the railing's condition. Otherwise, the railing should not be evaluated.
- Refer to Appendix B for sketches of acceptable and unacceptable traffic rails for item 36. The sketches may be misleading. It seems the railing is obsolete if the curb width is any wider than 9". This is not true. If the railing is 42" higher than the sidewalk it may be acceptable. We don't think we have any of these, but we will address them in a case-by-case situation if they exist.
- When there is traffic impact damage to bridge railing, do not code the Traffic Impact Smart Flag. Instead, code the failed section of the traffic railing in the worst condition state.
- Railings on RCBs are coded only if they are attached to the box.
- Culvert headwalls are coded as railing only if they are greater than 27 inches tall.
- Refer to Appendix A for additional comments.

Associated Elements

924 Concrete (Railing) Protective Coating

Associated Oklahoma Items

204 Type of Railing

RAILING

Condition States

If the offset between the curb and the rail is two inches or less, then include the condition of the curb in the rail condition rating.

Condition State 1
Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (1190) – No abrasion or wearing

Feasible Actions - Do nothing/Protect

Condition State 2
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC) (1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Feasible Actions - Do nothing/Protect/Repair

Condition State 3
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%) but does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC) (1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Feasible Actions - Do nothing/Protect/Repair/Rehabilitate/Replace

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

Feasible Actions - Do nothing/Protect/Repair/Rehabilitate/Replace

RAILING

332 Timber Bridge Railing (NBE) **LF**

Defines all types and shapes of timber bridge railings. All elements of the railing must be timber. The element quantity includes the number of rows of bridge rail times the length of the bridge; includes only the rail on the bridge. The number of rows of rail on a bridge is commonly two, one on each side of the traveled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lanes. Refer to the other bridge rail elements (steel, concrete, masonry, other) for specific defects for assessing the condition of posts, blocking and curbs that may be constructed of materials other than metal.

- When the rail is in good shape, but the anchorage or the deck it is attached to is in poor condition requires your judgment. If it is just an anchorage problem and can be resolved by replacing anchor devices, then the railing needs to be down- rated. However, if the soffit has deteriorated to the degree that it cannot support an anchorage system; code the condition of the railing as if the anchors are in good condition and note the deficiency in the comment section of the report.
- Define where the end of a railing is, such as when a concrete railing continues to the end of the approach slab. For consistency with the metal flexbeam that continues to the termination point, just consider the railing from end of bridge to end of bridge for quantifying the LF.
- If a railing is obsolete and coded as not meeting current standard in item 36, then it will be the inspector's responsibility to estimate whether they believe we will continue to maintain the railing in its current form when it becomes damaged. If we will continue to maintain the rail, it makes sense to continue capturing the railing's condition. Otherwise, the railing should not be evaluated.
- Refer to Appendix B for sketches of acceptable and unacceptable traffic rails for item 36. The sketches may be misleading. It seems the railing is obsolete if the curb width is any wider than 9". This is not true. If the railing is 42" higher than the sidewalk it may be acceptable. We don't think we have any of these, but we will address them in a case-by-case situation if they exist.
- When there is traffic impact damage to bridge railing, do not code the Traffic Impact Smart Flag. Instead, code the failed section of the traffic railing in the worst condition state.
- Railings on RCBs are coded only if they are attached to the box.

Associated Oklahoma Items

204 Type of Railing

RAILING
Condition States

If the offset between the curb and the rail is two inches or less, then include the condition of the curb in the rail condition rating. Defects in yellow apply to curb only.

Condition State 1 **Feasible Actions -** Do Nothing/Protect
Connection (1020) – Connection is in place and functioning as intended.
Decay/Section Loss (1140) – None.
Check/Shake (1150) – Surface penetration less than 5% of the member thickness regardless of location.
Cracks (1160) – None.
Split/Delamination (1170) – None.
Abrasion/Wear (1180) – None or no measurable section loss.
Delamination/Spall/Patched Area (1080) – None
Exposed Rebar (1090) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC) (1130) – Sealed crack width less than 0.012 in. or spacing greater than 3.0 ft.
Abrasion/Wear (1190) – No abrasion or wearing

Condition State 2 **Feasible Actions -** Do Nothing/Protect/Repair
Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Decay/Section Loss (1140) – Affects less than 10% of the member section.
Check/Shake (1150) – Penetrates 5%-50% of the thickness of the member and not in a tension zone.
Cracks (1160) – Crack that has been arrested through effective measures.
Split/Delamination (1170) – Length less than the member depth or arrested with effective action taken to mitigate.
Abrasion/Wear (1180) –Section loss less than 10% of the member thickness.
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Exposed Rebar (1090) – Present without section loss.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC) (1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Abrasion/Wear (1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Condition State 3 **Feasible Actions -** Do nothing/Protect/Repair/Rehabilitate/Replace
Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.
Decay/Section Loss (1140) – Affects 10% or more of the member but does not warrant a structural review.
Check/Shake (1150) – Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.
Cracks (1160) – Identified crack that is not arrested, but does not warrant a structural review.
Split/Delamination (1170) – Length equal to or greater than the member depth but does not warrant structural review**.**
Abrasion/Wear (1180) –Section loss 10% or more of the member thickness but does not warrant structural review.
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%). Does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC) (1130) - Width greater than 0.05 in. or spacing of less than 1 ft.
Abrasion/Wear (1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Condition State 4 **Feasible Actions -** Do nothing/Protect/Repair/Rehabilitate/ReplaceFor all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

RAILING

333 Other Bridge Railing (NBE) **LF**

Defines all types and shapes of bridge railing except those defined as metal, concrete, timber, or masonry. This element will include cable rails and all railings made of a combination of materials. The quantity is the number of rows of bridge rails times the length of the bridge; includes only the rail on the bridge. This element should be used for materials not otherwise defined or combinations of materials. The number of rows of rail on a bridge is commonly two, one on each side of the travelled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lanes.

- When the rail is in good shape, but the anchorage or the deck it is attached to is in poor condition requires your judgment. If it is just an anchorage problem and can be resolved by replacing anchor devices, then the railing needs to be down- rated. However, if the soffit has deteriorated to the degree that it cannot support an anchorage system; code the condition of the railing as if the anchors are in good condition and note the deficiency in the comment section of the report.
- Define where the end of a railing is, such as when a concrete railing continues to the end of the approach slab. For consistency with the metal flexbeam that continues to the termination point, just consider the railing from end of bridge to end of bridge for quantifying the LF.
- If a railing is obsolete and coded as not meeting current standard in item 36, then it will be the inspector's responsibility to estimate whether they believe we will continue to maintain the railing in its current form when it becomes damaged. If we will continue to maintain the rail, it makes sense to continue capturing the railing's condition. Otherwise, the railing should not be evaluated.
- Refer to Appendix B for sketches of acceptable and unacceptable traffic rails for item 36. The sketches may be misleading. It seems the railing is obsolete if the curb width is any wider than 9". This is not true. If the railing is 42" higher than the sidewalk it may be acceptable. We don't think we have any of these, but we will address them in a case-by-case situation if they exist.
- When there is traffic impact damage to bridge railing, do not code the Traffic Impact Smart Flag. Instead, code the failed section of the traffic railing in the worst condition state.
- Railings on RCBs are coded only if they are attached to the box.
- Refer to Appendix A for additional comments.

RAILING
Condition States

If the offset between the curb and the rail is two inches or less, then include the condition of the curb in the rail condition rating. Defects in yellow apply to curb only.

Condition State 1

Corrosion (1000) – None
Cracking (1010) – None
Connection (1020) – Connection is in place and functioning as intended.
Delamination/Spall/Patched Area (1080) – None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – None
Cracking (RC)(1130) - Width less than 0.012 in. or spacing greater than 3.0 ft.
Distortion (1900) – None
Exposed Rebar (1090) - None
Abrasion/Wear (1190) – No abrasion or wearing

Feasible Actions - Do Nothing/Protect

Condition State 2

Corrosion (1000) - Freckled Rust. Corrosion of the steel has initiated.
Cracking (1010) – Crack has self-arrested or has been arrested with effective arrest holes, doubling plates or similar.
Connection (1020) – Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Cracking (RC) (1130) - Width 0.012-0.05 in. or spacing of 1.0 - 3.0 ft.
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.
Exposed Rebar (1090) – Present without section loss.
Abrasion/Wear (1190) – Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.

Feasible Actions - Do Nothing/Protect/Repair

Condition State 3

Corrosion (1000) - Section loss is evident or pack rust is present but does not warrant structural review.
Cracking (1010) – Identified crack that is not arrested but does not warrant structural review.
Connection (1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. or less in diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Cracking (RC) (1130) - Width greater than 0.05 in. or spacing of less than 1.0 ft.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Exposed Rebar (1090) – Present with measurable section loss (less than 15%). Does not warrant structural review.
Abrasion/Wear (1190) – Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.

Feasible Actions - Do nothing/Protect/Repair/Rehabilitate/Replace

Condition State 4

For all defects except damage - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Feasible Actions - Do nothing/Protect/Repair/Rehabilitate/Replace

RAILING

334 Masonry Bridge Railing (NBE) **LF**

Defines all types and shapes of masonry block or stone bridge railing. All elements of the railing must be masonry block or stone. The quantity is the number of rows of bridge rail times the length of the bridge; includes only the rail on the bridge. The number of rows of rail on a bridge is commonly two, one on each side of the travelled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lanes.

- When the rail is in good shape, but the anchorage or the deck it is attached to is in poor condition requires your judgment. If it is just an anchorage problem and can be resolved by replacing anchor devices, then the railing needs to be down- rated. However, if the soffit has deteriorated to the degree that it cannot support an anchorage system; code the condition of the railing as if the anchors are in good condition and note the deficiency in the comment section of the report.
- Define where the end of a railing is, such as when a concrete railing continues to the end of the approach slab. For consistency with the metal flexbeam that continues to the termination point, just consider the railing from end of bridge to end of bridge for quantifying the LF.
- If a railing is obsolete and coded as not meeting current standard in item 36, then it will be the inspector's responsibility to estimate whether they believe we will continue to maintain the railing in its current form when it becomes damaged. If we will continue to maintain the rail, it makes sense to continue capturing the railing's condition. Otherwise, the railing should not be evaluated.
- Refer to Appendix B for sketches of acceptable and unacceptable traffic rails for item 36. The sketches may be misleading. It seems the railing is obsolete if the curb width is any wider than 9". This is not true. If the railing is 42" higher than the sidewalk it may be acceptable. We don't think we have any of these, but we will address them in a case-by-case situation if they exist.
- When there is traffic impact damage to bridge railing, do not code the Traffic Impact Smart Flag. Instead, code the failed section of the traffic railing in the worst condition state.
- Railings on RCBs are coded only if they are attached to the box.
- Refer to Appendix A for additional comments.

RAILING

Condition States

Condition State 1
Delamination/Spall/Patched Area (1080) - None
Efflorescence/Rust Staining/Discoloration/Sweating (1120) - None
Mortar Breakdown (1610) - None
Split/Spall (1620) - None
Patched Area (1630) – None
Masonry Displacement (1640) – None
Distortion (1900) – None

Feasible Actions - Do Nothing/Protect

Condition State 2
Delamination/Spall/Patched Area (1080) – Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Surface white without build-up or leaching without rust staining.
Mortar Breakdown (1610) – Cracking or voids in less than 10% of joints.
Split/Spall (1620) – Block or stone has split or spalled with no shifting.
Patched Area (1630) – Sound patch.
Masonry Displacement (1640) – Block or stone has shifted slightly out of alignment
Distortion (1900) – Distortion not requiring mitigation or mitigated distortion.

Feasible Actions - Do Nothing/Protect/Repair

Condition State 3
Delamination/Spall/Patched Area (1080) – Spall greater than 1 in. deep or greater than 6 in. in diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Efflorescence/Rust Staining/Discoloration/Sweating (1120) – Heavy build-up with rust staining.
Mortar Breakdown (1610) – Cracking or voids in 10% or more of the joints.
Split/Spall (1620) – Block or stone has split or spalled with shifting but does not warrant a structural review.
Patched Area (1630) – Unsound patch.
Masonry Displacement (1640) – Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.
Distortion (1900) – Distortion that requires mitigation that has not been addressed but does not warrant structural review.

Feasible Actions - Do Nothing/Protect/Repair/Rehabilitate/Replace

Condition State 4
For all defects - The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.

Feasible Actions - Do Nothing/Protect/Repair/Rehabilitate/Replace

STAY-IN-PLACE FORMS

890 Steel Stay-In Place Forms (OE) **EA**

Defines steel forms used during construction of reinforced concrete bridge decks which are intended to be left in place during the service life of the bridge. (Coded 1 EA, only one per bridge)

- In the event of debris falling over traffic lanes contact bridge owner for immediate remediation. This constitutes a CX follow-up recommendation.

Condition States

Condition State 1
Corrosion - None

Feasible Action – Do Nothing

Condition State 2
Corrosion – Freckled rust

Feasible Action – Do Nothing

Condition State 3
Corrosion – Section loss

Feasible Action – Do Nothing

Condition State 4
Debris is falling over traffic lanes.

Feasible Action – Do Nothing/Remove element

STAY-IN-PLACE FORMS

891 P/S Concrete Stay-In Place Forms (OE) **EA**

Defines prestressed concrete forms used during construction of reinforced concrete bridge decks which are intended to be left in place during the service life of the bridge. (Coded 1 EA, only one per bridge)

- In the event of debris falling over traffic lanes contact bridge owner for immediate remediation. This constitutes a CX follow-up recommendation.

Condition States

Condition State 1
Cracking – Minor
Leaching/Efflorescence - None

Feasible Action – Do Nothing

Condition State 2
Cracking – Moderate
Leaching/Efflorescence – May be present

Feasible Action – Do Nothing

Condition State 3
Cracking – Severe
Leaching/Efflorescence - Present

Feasible Action – Do Nothing

Condition State 4
Debris is falling.

Feasible Action – Do Nothing/Remove element

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PROTECTIVE SYSTEMS

(Wearing Surfaces / Protective Coatings)

WEARING SURFACES

510 Wearing Surfaces (BME) **SF**

All decks/slabs that have overlays made with flexible (asphaltic concrete), semi rigid (epoxy and polymer material), or rigid (Portland cement) materials; and timber running planks. Also included are soil and gravel overlays. The quantity for this element should include the area of the deck/slab from curb to curb that is protected by this wearing surface.

- Code element 510 when an overlay is applied to any at-grade structure. For arches, element 510 cannot be added unless a deck or slab element exists.
- For full overlays, the quantity may be the same as the associated deck/slab element.
- Does not include flood coats. See element 521, Concrete (Deck) Protective Coating.

Associated Elements

12 Reinf. Conc. Deck
15 P/S or Reinf. Conc. Top Flange
28 Steel Deck Open Grid
30 Steel Deck-Corrug./Ortho.
31 Timber Deck
38 Reinf. Conc. Slab
54 Timber Slab
241 Reinforced Concrete Culvert (At-Grade Culverts only)

Associated Oklahoma Items

246 Type of Overlay
266 Riding Surface Roughness

WEARING SURFACES

Condition States

Condition State 1

Spalls/Delaminations/Patched Areas/Potholes (Wearing Surface) (3210) – None
Crack (Wearing Surface)(3220) – Width less than 0.012 in. or spacing greater than 3.0 ft.
Effectiveness (3230) – Fully effective. No evidence of leakage or further deterioration of the protected element.
Decay/Section Loss (Timber)(1140) – None.
Split/Delamination (Timber)(1170) – None.
Abrasion/Wear (Timber)(1180) – None or no measurable section loss.
Connection (Timber)(1020) – None.

Condition State 2

Spalls/Delaminations/Patched Areas/Potholes (Wearing Surface) (3210) – Delaminated. Spall less than 1 in. deep or less than 6 in. in diameter. Patched area that is sound. Partial depth pothole.
Crack (Wearing Surface)(3220) – Width 0.012-0.05 in. or spacing of 1.0-3.0 ft.
Effectiveness (3230) – Fully effective. Substantially effective. Deterioration of the protected element has slowed.
Decay/Section Loss (Timber)(1140) – Affects less than 10% of the member section.
Split/Delamination (Timber)(1170) – Length less than the member depth or arrested with effective actions taken to mitigate.
Abrasion/Wear (Timber)(1180) – Section loss less than 10% of the member thickness.
Connection (Timber)(1020) – Connection is in place and functioning as intended.

Condition State 3

Spalls/Delaminations/Patched Areas/Potholes (Wearing Surface) (3210) – Spall 1 in. or greater or 6 in. diameter or greater. Patched area that is unsound or showing distress. Full depth pothole.
Crack (Wearing Surface)(3220) – Width of more than 0.05 in. or spacing of less than 1.0 ft.
Effectiveness (3230) – Limited effectiveness. Deterioration of the protected element has progressed.
Decay/Section Loss (Timber)(1140) – Affects 10% or more of the member but does not warrant a structural review.
Split/Delamination (Timber)(1170) – Length equal to or greater than the member depth but does not warrant structural review.
Abrasion/Wear (Timber)(1180) – Section loss 10% or more of the member thickness but does not warrant structural review.
Connection (Timber)(1020) – Missing bolts, rivets or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.

Condition State 4

For all defects - The wearing surface is no longer effective.

PROTECTIVE COATINGS

515 Steel (Superstructure) Protective Coating (BME) **SF**

Steel superstructure elements that have a protective coating such as paint, galvanization, weathering steel patina or other top coat steel corrosion inhibitor. The quantity for this element will be computed per the appropriate example below.

918 Steel (Substructure) Protective Coating (OE) **SF**

Steel substructure elements that have a protective coating such as paint, galvanization, weathering steel patina or other top coat steel corrosion inhibitor. The quantity for this element will be computed per the appropriate example below.

919 Steel (Railing) Protective Coating (OE) **SF**

Steel railing elements that have a protective coating such as paint, galvanization, weathering steel patina or other top coat steel corrosion inhibitor. The quantity for this element will be computed per the appropriate example below.

- Typically, lead-based paint was used before 1977. The surface is silver in color. The prime coat is orange and contains lead. Typically, non-lead based paint is used after 1977.
- If a bridge has ever been painted, regardless of the current paint condition, then code the appropriate protective coating element.

Associated Oklahoma Items

225	Paint Type and Overcoat System	243a/b	Avg. Girder Spacing and no. of girders
226	Date Painted	244	Span length
227	Paint Color	245	Girder Depth

Sq. Ft. Calculation Formulas

The formulas provided here are approximations only. They are provided for ease and uniformity of obtaining the required Sq. Ft. quantity calculations.

Surface area of wide flange beam: (Member Length x [(2 x Depth) + (3 x Width)]) x 1.10

Surface area of stiffened plate girders: (Member Length x [(2 x Depth) + (3 x Width)]) x 1.15*

* x1.15 to account for more stiffeners present on the member.

Surface area of steel column/pile bent: (Member Length x [(2 x Depth) + (4 x Width)]) x 1.10

Surface area of steel abutment: (Length x Width) x 1.25**

** x1.25 due to most steel abutments are corrugated steel.

Surface area of steel overhead truss: Refer to chart on page 74.

Surface area of steel pony truss: Refer to chart on page 74.

Surface Area of steel arch: [Width of Arch x ([Length of Arch/2] x Pi)] x 1.10***

*** x 1.25 if the arch is a corrugated metal arch.

Surface area of steel railing: (Member length x member outer perimeter measurement x 1.10)

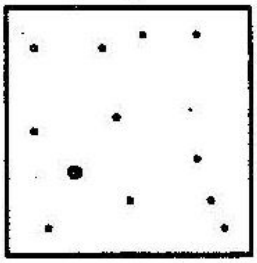
PROTECTIVE COATINGS

Condition States

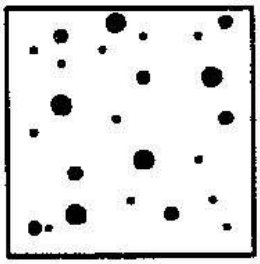
The protective coating element quantities are recorded as Sq. Ft. However, the entire quantity shall be placed in a single condition state.

Condition State 1
Chalking (3410) - None
Peeling/Bubbling/Cracking (3420) - None
Oxide Film Degradation Color/Texture Adherence (3430) – Yellow-orange or light brown for early development. Chocolate-brown to purple-brown for fully developed. Tightly adhered, capable of withstanding hammering or vigorous wire brushing.
Effectiveness (3440) – Fully effective. Area of rust per unit of measurement is between 0 – 0.3%.

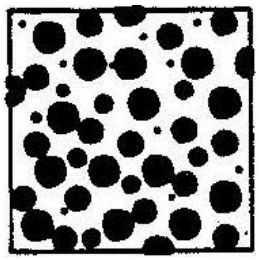
Condition State 2
Chalking (3410) – Surface dulling.
Peeling/Bubbling/Cracking (3420) – Finish coats only.
Oxide Film Degradation Color/Texture Adherence (3430) – Granular texture
Effectiveness (3440) – Substantially effective. Area of rust per unit of measurement is between 0.3% – 3.0%.



Condition State 3
Chalking (3410) – Loss of pigment.
Peeling/Bubbling/Cracking (3420) – Finish and primer coats.
Oxide Film Degradation Color/Texture Adherence (3430) – Small flakes, less than ½ in. diameter.
Effectiveness (3440) – Limited effectiveness. Area of rust per unit of measurement is between 3.0% – 33.0%.



Condition State 4
Chalking (3410) – Not applicable.
Peeling/Bubbling/Cracking (3420) – Exposure of bare metal.
Oxide Film Degradation Color/Texture Adherence (3430) – Dark black color. Large flakes, ½ in. diameter or greater, or laminar sheets or nodules.
Effectiveness (3440) – Failed; no protection of the underlying metal. Area of rust per unit of measurement is more than 33.0%.



Images from the SSPC-VIS 2, Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces, SSPC: The Society for Protective Coatings, Publication #00-08.

PROTECTIVE COATINGS

521 Concrete (Deck) Protective Coating (BME) **SF**

Concrete deck elements that have a uniform, visible protective coating applied to them. These coatings include epoxy penetrants, High Molecular Weight Methacrylate (HMWM) or any top coat barrier that protects concrete from deterioration and reinforcing steel from corrosion. Also includes flood coats. The quantity for this element will be computed per the appropriate example below.

922 Concrete (Superstructure) Protective Coating (OE) **SF**

Concrete superstructure elements that have a uniform, visible protective coating applied to them. These coatings include any top coat barrier that protects concrete from deterioration and reinforcing steel from corrosion. Superstructure cracks may be individually sealed.
The quantity for this element will be computed per the appropriate example below. Typically only the exterior faces of the outside beams are coated.

923 Concrete (Substructure) Protective Coating (OE) **SF**

Concrete substructure elements that have a uniform, visible protective coating applied to them. These coatings include any top coat barrier that protects concrete from deterioration and reinforcing steel from corrosion. Substructure cracks may be individually sealed.
The quantity for this element will be computed per the appropriate example below.

924 Concrete (Railing) Protective Coating (OE) **SF**

Concrete railing elements that have a uniform, visible protective coating applied to them. These coatings include any top coat barrier that protects concrete from deterioration and reinforcing steel from corrosion.
The quantity for this element will be computed per the appropriate example below.

Associated Oklahoma Items

225	Paint Type and Overcoat System	243a/b	Avg. Girder Spacing and no. of girders
226	Date Painted	244	Span length
227	Paint Color	245	Girder Depth

Sq. Ft. Calculation Formulas

The formulas provided here are approximations only. They are provided for ease and uniformity of obtaining the required Sq. Ft. quantity calculations.

Surface area of Concrete (Deck) Protective Coating: Use the same area quantity as the associated deck element.

Surface area of Concrete (Superstructure) Protective Coating: Member length x [8.2 (Type II) or
10.2 (Type III) or
12.25 (Type IV) or
17.75 (Bulb T)]

Surface area of Concrete (Substructure) Protective Coating: (Length x Width)

Surface area of Concrete (Railing) Protective Coating: (Perimeter of railing x bridge length)

A concrete slurry finish is not a protective coating.

PROTECTIVE COATINGS

Condition States

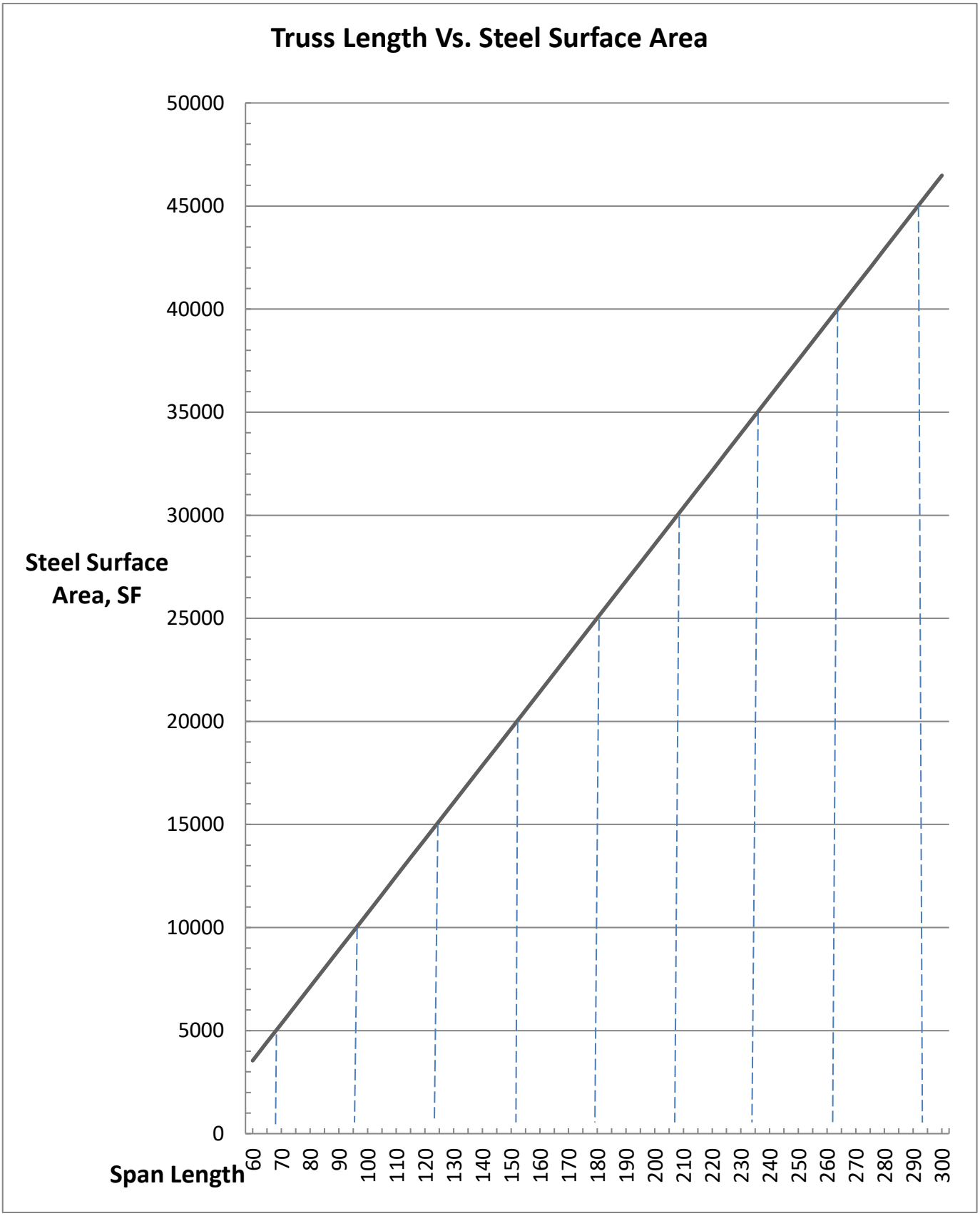
The protective coating element quantities are recorded as Sq. Ft. However, the entire quantity shall be placed in a single condition state.

Condition State 1
Wear (Concrete Protective Coating)(3510) - None
Effectiveness (Concrete Protective Coating)(3540) – Fully effective.
Deck Surface Coating – All cracks are sealed by flood coat (deck only) or all cracks are individually sealed (superstructure and substructure only).

Condition State 2
Wear (Concrete Protective Coating)(3510) – Underlying concrete not exposed; coating showing wear from UV exposure; friction course missing.
Effectiveness (Concrete Protective Coating)(3540) – Substantially effective.
Deck Surface Coating – Less than 15% of deck cracks are unsealed.

Condition State 3
Wear (Concrete Protective Coating)(3510) – Underlying concrete is not exposed; thickness of the coating is reduced.
Effectiveness (Concrete Protective Coating)(3540) – Limited effectiveness.
Deck Surface Coating – 15% or more of deck cracks are unsealed.

Condition State 4
Wear (Concrete Protective Coating)(3510) – Underlying concrete exposed; Protective coating no longer effective.
Effectiveness (Concrete Protective Coating)(3540) – The protective system has failed or is no longer effective.
Deck Surface Coating – No cracks are sealed.



For truss bridge spans less than 60 ft. long, use a percentage of the sq. ft. area of a 60 ft. span (3500 sq. ft.). E.g., 30 ft. = 50% = 1750 sq. ft. and 55ft. = 92% = 3220 sq. ft.

OKLAHOMA SMART FLAGS

SMART FLAGS

956 Steel Cracking/Fatigue (OE) **EA**

This flag shall be used with steel elements to identify fatigue damage.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
Steel Deck Only	X		X

Inspector Comments

_____

_____

_____

Condition States

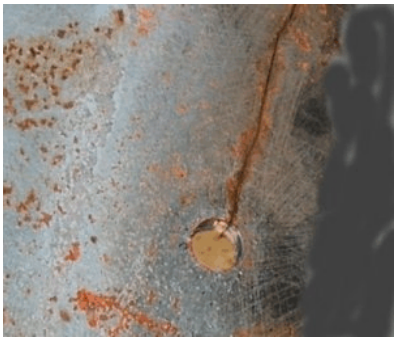
Condition State 1

Fatigue damage to the bridge has been repaired or arrested. The bridge may still be fatigue prone.

Condition State 2

Fatigue damage exists that is not arrested (normally, this condition state would be used the first time the element is identified and at any other time when additional fatigue damage occurs). Crack length is less than 1".

Feasible Action - Monitor



Condition State 3

Fatigue damage that is not arrested and crack length is between 1" and 2".

Feasible Action - Drill

Condition State 4

Fatigue damage exists that warrants analysis of the element to ascertain the serviceability of the element or the bridge. Crack length is greater than 2" or has propagated beyond a previous repair.

Feasible Action – Plate Repair

957 Pack Rust (OE) **EA**

This flag shall be used in conjunction with steel elements connection defects (including shapes in contact in built-up members) of steel bridges that are already showing signs of rust packing between plates or between the top flange of a steel member and the deck.

- Do not code "Pack Rust" on trusses unless it is affecting the primary structural members (truss members, stringers, and floorbeams, built-up girders, etc.). This smart flag does not apply to diaphragms, sway and lateral bracing.
- Refer to Appendix A for additional comments.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
Steel Deck Only	X		X

Associated Oklahoma Item

248 No. of Field Splices with Severe Corrosion

Condition States

Condition State 1

The connection is showing signs of rusting between plates. Seams of the connection exhibit rust staining.

Condition State 2

Rusting between plates is beginning to distress the connection. Minor swelling exists.

Condition State 3

Rusting between plates has caused serious distress to the connection. The plates may be badly distorted, however all connectors (rivets/bolts) are still functioning.

Condition State 4

Rusting between plates has caused serious distress to the connection, which warrants analysis of the bridge to ascertain the impact on the serviceability of the bridge. Some rivets or other connectors may have popped or are no longer effective.

958 Smart Flag Concrete Cracking **EA**

This flag shall be used with concrete elements to identify concrete deck cracking. Do not use when there is an asphalt overlay on the deck. Use for culverts only in the case of at-grade boxes with zero ft. of fill (bare top surface).
(Coded 1 EA, only one per bridge)

- Refer to Table A: Crack Width Comparison on page 28.
- Refer to Appendix A for additional comments.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
X			X

Inspector Comments

Condition States

Condition State 1
The surface of the concrete is cracked, but the cracks have been sealed.

Condition State 2
Unsealed cracks exist in the concrete which are of minor size or density.

Condition State 3
Unsealed cracks exist in the concrete which are of moderate size or density.

Condition State 4
Unsealed cracks exist in the concrete which are of severe size or density.

- -

	Average Size (Width)		Density (Regardless of Size)
Minor	< 0.012 in.	or	Cracks spaced > 3’ apart (Avg.)
Moderate	0.012 in. – 0.05 in.	or	Cracks spaced 1’ - 3’ apart (Avg.)
Severe	> 0.05 in.	or	Cracks spaced < 1’ apart (Avg.)

You may spray the concrete with water to help cracks become visible.

SMART FLAGS

960 Smart Flag Settlement **EA**

This flag shall be used to identify the severity of the settlement. This flag is not for approach slabs, wingwalls or aprons. (Coded 1 EA, only one per bridge)

- Refer to Appendix A for additional comments.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
		X	X

Associated Smart Flags

961 Scour

Inspector Comments

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_____

Condition States

Condition State 1

Settlement has been stabilized by repair. This condition state is not to be used for initial discovery.

Condition State 2

Some of the bridge or culvert supporting elements are showing signs of visible settlement or rotation. This condition state should be used the first time the element is discovered.

Condition State 3

Settlement or rotation of the bridge or culvert supporting elements show signs of continuing and, if left un-arrested, could cause adverse impacts to the bridge.

Condition State 4

Settlement or rotation of the bridge or culvert supporting elements is significant enough to warrant analysis of the bridge.

SMART FLAGS

961 Scour (OE) **EA**

This flag shall be used to identify the severity of the scour.

- This Smart Flag does not apply to erosion at the abutments unless it is scour related. (Refer to Smart Flag 966 (Exposed Abutment Piling) and Smart Flag 968 (Erosion).
- Please indicate locations and magnitudes of each area of concern. Read and compare with past inspection reports, looking for trends or sudden changes.
- Refer to the discussion of item 113 in appendix C, for culverts, the table provided here indicates which condition state should be assigned.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
		X	X

Inspector Comments:

_____

_____

Condition States

Condition State 1– A number of pier/abutment foundations exist where no scour is present, or the scour has been repaired and is functioning as designed. Stream flowline is at culvert flowline or above curtain wall.

Condition State 2 – A number of pier/abutment foundations exist where scour is superficial and has no effect on the foundation structural capacity. No exposed spread footings. Minimum pile embedment is greater than 10'. The substructure code is not affected by scour. Culvert flowline is more than 2 ft. above flowline. Minor barrel or apron undermining may be present. Monitor the scour condition.

Condition State 3 – A number of pier/abutment foundations exist where scour is present but does not significantly affect the foundation structural capacity. Scour does not warrant analysis, but may require repairs. If left unchecked, could adversely impact the foundation structural capacity. Top of spread footings may be exposed. Minimum pile embedment is between 5' and 10'. Reanalysis of the scour code may be warranted. Culvert flowline is more than 2 ft. above flowline with significant barrel, wing wall or apron undermining present. Standing water is present upstream of RCB or through barrel. Repairs to the bridge may be warranted. Contact the PE Program Manager and schedule a site visit.

Condition State 4 – A number of pier/abutment foundations exist with scour damage in significant locations or quantity which has reduced the foundation structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the pier. Undermining of spread footings or foundation material is occurring. Minimum pile embedment is less than 5'. NBI scour should be coded 2 or less. Make comment that the substructure rating is based on scour. Evaluate and comment on any riprap or other scour countermeasures that are in place. Make a recommendation to evaluate the pile for lateral stability. Channel flowline is below toe of curtain wall or barrel with significant barrel, wing wall or apron undermining present. Wing or barrel wall cracking with seepage has occurred. Standing water is present upstream of RCB and/or through barrel. Document the scour condition thoroughly. Repairs to the bridge are necessary. Contact Bridge Hydraulic or Bridge Field Service Engineer to schedule a site visit.

962 Superstructure Traffic Impact (OE) **EA**

This flag shall identify all traffic collisions with the superstructure. Application of the flag is in relation to the impact on the structures capacity to carry load. This smart flag will include damage to a compression member that is bent or twisted out of alignment. Also include distress due to other causes of impact (e.g., drift). (Coded 1 EA, only one per bridge)

- Do not use this smart flag for traffic damage on the railing. Instead, code the failed section of the traffic railing in the worst condition state.
- Refer to Appendix A for additional comments.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
	X		

Inspector Comments

_____
_____
_____
_____
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Condition States

Condition State 1 – Impact damage has occurred and has been repaired. Prestressing system is covered by patch concrete. Steel has been straightened or repaired.

Condition State 2 - Use when impact damage is first noted, even in situations where only minor damage or abrasion is evident.

Condition State 3 - Impact damage has occurred. Prestressing system is exposed but is not impaired. Any reduction in steel strength does not threaten the serviceability of the bridge.

Condition State 4 - Impact damage has occurred and strength of the member is impaired. Analysis is warranted to ascertain the serviceability of the bridge.

SMART FLAGS

963 Steel Section Loss (OE) **EA**

This flag shall be used with steel elements to identify the severity of section loss.

- Refer to Appendix A for additional comments.

Associated Oklahoma Items 248 Number of Field Splices with Severe Corrosion

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
Steel Deck Only	X	X	X

Inspector Comments

_____

_____

Condition States

Condition State 1

Section loss to the element has been repaired, cleaned and painted over. The bridge may still be prone to corrosion.

Condition State 2

Minor section loss (less than 15%) to the element exists and has not been repaired or painted over. Structural analysis is not yet warranted.

Condition State 3

Measurable section loss (15% or more) to the element exists that warrants analysis to determine the serviceability of the elements or the bridge, or an analysis has been done and it has been determined that serviceability has not been affected.

Condition State 4

Section loss has affected the load carrying capacity or serviceability of the bridge. (Code this state only after a structural analysis.)

Measuring Section Loss

965 Debris (OE) **EA**

Addresses structures with accumulated debris under the bridge or within 50' upstream of the bridge. Also verify Item 61 rating. If overtopping is a problem, also verify item 71. The scour smart flag (961) may also apply. (Coded 1 EA, only one per bridge)

- Refer to Appendix A for additional comments.
- Refer to appropriate bearing element condition state notes for debris at bearings.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
		X	X

Inspector Comments

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_____
_____
_____

Condition States

Condition State 1

Debris has been removed and bank deterioration has been arrested or repaired.

Condition State 2

Debris exists with more than 5% and less than 25% of the box opening or pier height blocked. Minor channel flow restriction or movement may be evident or channel banks are beginning to slump. Debris of less than 5% may be included at the inspector's discretion.

Condition State 3

Debris exists with 25% or more but less than 50% of the box opening or pier height blocked. Moderate channel flow restriction is evident and/or bank protection is undermined.

Condition State 4

Debris exists with 50% or more of the box opening or pier height blocked. Significant channel flow restriction or movement. Overtopping may exist. Bank protection has failed.

966 Exposed Abutment Piling (OE) **EA**

Addresses structures where steel or timber pilings at abutments have become exposed for any reason. Exposure of all pilings from both abutments will be considered 100% exposure. If only one abutment is affected, the exposure can be no more than 50%. (Coded 1 EA, only one per bridge)

- Code this smart flag only for skeleton and integral abutments with steel or timber piling. Refer to Appendix B.
- If more than one pile is exposed more than five feet, the inspector should drop the condition state to the next worse level.
- The Scour Smart Flag (961) and the Steel Section Loss Smart Flag (963) may also apply.
- Wing piles are not considered for this smart flag, but exposed wing piles should be identified as Column or Pile Extension for the appropriate material.
- Anytime this element is used for an On System bridge, the element notes should indicate the 'PX' repair recommendation except in situations where a 'CX' is warranted. Off System bridges are exempt from this requirement except in situations where a 'CX' is warranted..
- Refer to Appendix A for additional comments.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
		X	

Inspector Comments

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_____
_____
_____

Condition States

Condition State 1

Abutment has been repaired and piling is no longer exposed. A 'PX' repair recommendation is no longer required after repairs.

Condition State 2

Exists with one or more pilings exposed up to no more than five feet. Piling exposure is equal to or less than 25%. One or both abutments may be affected.

Condition State 3

Exists with the piling exposure greater than 25% but equal to or less than 50%. One or both abutments may be affected.

Condition State 4

Pilings at both abutments are exposed with the piling exposure greater than 50%.

967 Substructure Traffic Impact (OE) **EA**

This flag shall identify all traffic collisions with the substructure. Application of the flag is in relation to the impact on the structures capacity to carry load.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
		X	

Condition States

Condition State 1

Impact damage has occurred and has been repaired.

Condition State 2

Use when impact damage is first noted, even in situations where only minor damage or abrasion is evident.

Feasible Action – Do Nothing

Condition State 3

Impact damage has occurred. Any reduction in substructure strength does not threaten the serviceability of the bridge.

Feasible Action – Do Nothing

Condition State 4

Impact damage has occurred and strength of the member is impaired. Analysis is warranted to ascertain the serviceability of the bridge.

Feasible Action – Do Nothing

968 Erosion (OE) **EA**

Addresses erosion under bridges or around culvert wingwalls which is not due to stream flow. This is not scour, but the results may be similar. This erosion can be caused from concentrated flow from the deck, side ditches, fields and other sources. (Coded 1 EA, only one per bridge)

- Refer to Appendix A for additional comments.
- If erosion affects multiple culvert wingwalls, consider only the wingwall with the most severe erosion.

Associated Smart Flags

961 Scour
966 Exposed Abutment Piling

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
		X	X

Inspector Comments

_____
_____
_____

Condition States

Condition State 1

Erosion exists but has not exposed any substructure foundation elements. No culvert wingwall has more than 10% of its area exposed due to erosion.

Condition State 2

Erosion exists and has exposed substructure foundations. The culvert wingwall with the most severe erosion has 10% or more but less than 25% of its area exposed due to erosion.

Condition State 3

Erosion has exposed foundations to the point where stability should be checked. (More than 5% of spread footing bases are exposed, more than 5 feet of piling are exposed or more than 10 feet of drilled shaft are exposed). The culvert wingwall with the most severe erosion has 25% or more but less than 50% of its area exposed due to erosion.

Condition State 4

Erosion has created stability problems. The substructure is settling or tilting. The culvert wingwall with the most severe erosion has 50% or more of its area exposed due to erosion.

SMART FLAGS

969 Out-of- Plane Distortion/Loading (OE) **EA**

Addresses visible bending/loading of **superstructure** elements caused by forces/loading conditions not accounted for in routine and conventional bridge design methodologies that could result in cracking and failure of **superstructure** elements.

- This smart flag **DOES NOT APPLY** to impact damage caused by traffic or drift. (Use SF 962)
- This smart flag **DOES NOT APPLY** to substructure elements. (Use SF 960 for substructure.)
- **Out of plane distortion/loading of fracture critical components could necessitate immediate notification of bridge owner for repairs**.

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
	X		

Inspector Comments

_____

_____

Condition States

Condition State 1

Out of plane distortion/loading exists on superstructure elements but has been repaired. (Automatically code as FX.)

Condition State 2

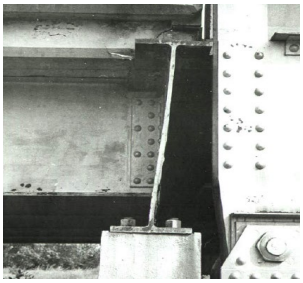
Out of plane distortion/loading exists on superstructure elements but has been mitigated with load posting, or has been assessed by an engineer. (Automatically code as FX.)

Condition State 3

Unmitigated out of plane distortion exists on superstructure elements. Use when visible distortion is first noted, even in situations where only minimum distortion is evident. (Automatically code as PX.)

Condition State 4

Out of plane distortion exists that could cause cracking or is excessive in nature. Analysis is warranted to ascertain the serviceability of the bridge. (Automatically code as CX and contact bridge owner.)



Smart Flag 970 (Wings) has been deleted.

971 Fiber Reinforced Polymer (FRP) Repair (OE) **LF**

Defines a polymer matrix fiber wrap used to repair damage or deterioration to columns, pier caps, pre-stressed girders or slab spans. The repair may completely surround the element (such as a column) and normally extend beyond the damaged area by one foot or more.

Use notes as necessary to associate this smart flag with all appropriate elements.

Smart Flag Application

Deck (Slab Span Only)	Superstructure	Substructure	Culvert
X	X	X	

Condition States

Condition State 1
Delamination – None
Protective Coating – Good condition

Feasible Action – Do Nothing

Condition State 2
Delamination – Total delamination area is less than 10% of the total FRP repair area.
Protective Coating – Coating distress is less than 10% of the total FRP repair area.

Feasible Action – Do Nothing/Repair delamination

Condition State 3
Delamination – Total delamination area is between 10% and 25% of the total FRP repair area.
Protective Coating – Coating distress is between 10% and 25% of the total FRP repair area.

Feasible Action – Do Nothing/Repair delamination/Replace coating

Condition State 4
Delamination – Extensive delamination has occurred and there is concern that either: 1) the patch concrete held in place by the FRP repair may turn loose on traffic or 2) the integrity of the structural FRP repair is a concern such that the member may not be able to carry the intended shear or flexure loads.
Protective Coating – Coating deterioration due to either deterioration beyond that of condition state 3 or impact damage.

Feasible Action – Do Nothing/Replace FRP

972 Loss Of Bearing (OE) **EA**

Defines bearing locations where material loss of concrete on the bearing seat or pier cap has reduced the area upon which the bearing normally sets. A portion of the bearing plate or anchor bolt may be exposed. The quantity will be recorded as only the number of bearing locations that have loss of bearing. Element may apply whether or not a bearing device or assembly is present.

Smart Flag Application

Deck (Slab Span Only)	Superstructure	Substructure	Culvert
		X	

Condition States

Condition State 1

Loss of bearing has been repaired.

Feasible Action – Do Nothing

Condition State 2

Loss of bearing is first detected or area is less than 10%.

Feasible Action – Do Nothing/Repair

Condition State 3

Loss of bearing is 10% or more.

Feasible Action – Do Nothing/Repair /Replace

Condition State 4

Loss of bearing has occurred and strength of the member is impaired. Analysis is warranted to ascertain the serviceability of the bridge.

Feasible Action – Do Nothing/Replace

973 Horizontal Force (OE) **EA**

Used when large horizontal forces are present, characterized by sheared anchor bolts, closed expansion joints often having distress in the barriers or beams into abutment back walls, excessive cracks at the abutment backwall/wing connection or buckled slope walls. The inspector shall note if the force is towards or away from the abutment back wall. (Coded 1 EA, only one per bridge)

Smart Flag Application

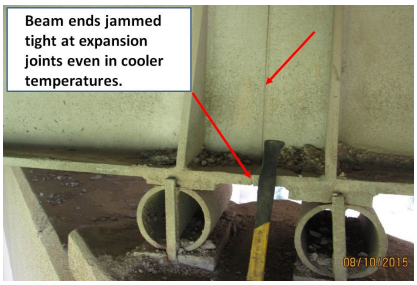
Deck	Superstructure	Substructure	Culvert
X	X	X	

Condition States

Condition State 1

Repairs have been made and horizontal forces have been minimized by the addition of joints on the bridge and/or approach pavement. Also used for bridges that have been converted to integral abutments – these bridges typically showed significant horizontal forces.

Feasible Action – Do Nothing



Condition State 2

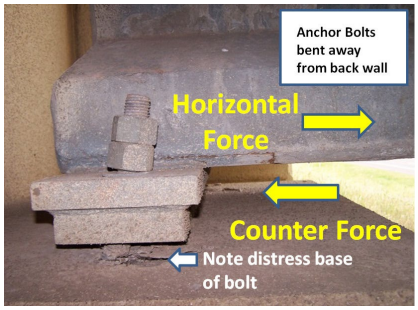
Repairs were made, but were not effective. Expansion joints are jammed even in cooler temperatures and no other distress is noted.

Feasible Action – Do Nothing/Repair

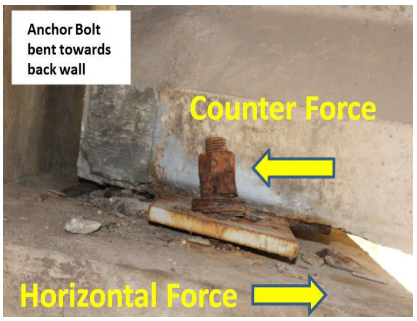
Condition State 3

Distress characterized by closed expansion joints, distress in the barrier walls at the expansion joints, numerous bent anchor bolts all bent in the same direction, buckling/cracking of slopewalls or cracks in the wing/back wall connection..

Feasible Action – Do Nothing/Repair /Replace



Case #1: Beam moves with respect to bridge seat - likely caused by pavement growth.

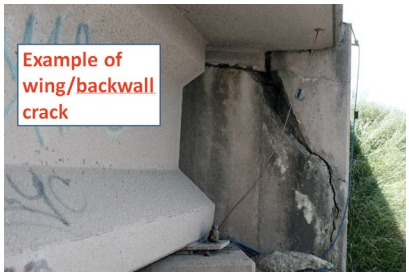


Case #2: Bridge seat moves with respect to beam - likely caused by lateral spreading (geotechnical issue).

Condition State 4

Distress characterized by beams into the back wall at the abutments, sheared anchor bolts, wide cracks (greater than ¼") in the wing/back wall connection, excessive buckling of the slopewall or other indications of excessive horizontal forces. Analysis is warranted to ascertain the serviceability of the bridge.

Feasible Action – Do Nothing/Replace



974 Straight Girder Diaphragm/Cross-frame (OE) **EA**

Used when a non-curved steel girder bridge has diaphragm(s) with deterioration. This smart flag addresses steel superstructures only. (Coded 1 EA, only one per bridge)

Smart Flag Application

Deck	Superstructure	Substructure	Culvert
	X		

Condition States

Condition State 1

Diaphragm deterioration has been repaired.

Feasible Action – Do Nothing

Condition State 2

Pack rust without deterioration is present in diaphragm connections. Pack rust between the diaphragm and bottom of the deck is present, but it is causing no adverse visible reaction to the diaphragm or deck.

Feasible Action – Do Nothing/Repair

Condition State 3

Section loss is evident or pack rust is present which is affecting either the diaphragm/beam connection or is contributing to deck uplift. Deterioration of the diaphragm requires repair (PX).

Feasible Action – Do Nothing/Repair /Replace

Condition State 4

Deterioration of the diaphragm is resulting in adverse reactions to the deck or superstructure. Removal/replacement or repair of the diaphragm is required.

Feasible Action – Do Nothing/Replace

SMART FLAGS

975 Supplemental Support (OE) **EA**

Defines supplemental supports that have been installed to shore or supplement existing substructure or superstructure units. The supplemental support may be constructed of steel, concrete, or timber. Supplemental supports are intended to be a temporary solution until a more permanent solution can be implemented. If the supplemental support persists for more than two cycles, the supplemental support should be considered as a permanent member and coded and rated accordingly. The quantity is one each per location, where each pier may be considered as a distinct location.

Smart Flag Application

Deck (Slab Span Only)	Superstructure	Substructure	Culvert
	X	X	

Condition States

Condition State 1

The supplemental support is in-place and performing as intended. The supplemental support shows no sign of overstress.

Feasible Action – Do Nothing

Condition State 2

The supplemental support is in-place and performing under load. There may be a gap between the support and the member intended to be supported, but there is no sign of overstress of the supplemental member or main member.

Feasible Action – Do Nothing/Shim

Condition State 3

The supplement support is in place and performing under load. A gap exists between the support and the member intended to be supported. The member that is intended to be supported has minor damage due to impact to the supplemental support, or is showing signs of overstress. The supplemental member may also be showing signs of overstress.

Feasible Action –Repair /Shim

Condition State 4

Supplemental members are no longer providing support in the intended fashion. Signs of overstress are evident in main members.

Feasible Action – Repair/Replace

NON-NBI BrM DATA ENTRIES

The following data entries are found on various BrM ODOT tab display screens. They are not related to elemental data and are not Federal NBI items or Oklahoma items. However, some of these items are required entries while others may be left blank since Oklahoma does not use the capability at this time. Please refer to the BrM User Manual for an explanation of the various pushbuttons found on many of the BrM display screens.

INSPECTION > CONDITION TAB

Condition Ratings section:

Unrepaired Spalls – Not used
NBI Converter Profile – Not used

Element Conditions section:

Element – Can be used as a quick filter if an element number is entered.
Struct. Unit – Not used
Env. – Not used
Quantity/Percent select buttons – select desired method of displaying element measurements.

Inspection Notes section: Notes from previous inspections are carried forward to new inspections. Enter new notes that are specific to the current inspection. Delete any notes that no longer apply.

Examples:
- 'Heavy vegetation/household trash in channel.'
- 'Load posting sign at N. end missing.'
- 'Load rating seems high for condition of bridge. Needs to be rerated.'
- 'Bridge recently overtopped.'
- 'Water up to girders, cannot inspect superstructure/substructure.'

INSPECTION > APPRAISAL TAB

Structural Appraisal section:

Fracture Critical Details - For fracture critical bridges, select the reason why the bridge is fracture critical.

A	One or two steel girder systems
B	Hinges with pin and hanger assemblies
C	Steel bent caps sustaining tensile stresses
D	Steel trusses
E	Steel tension elements consisting of less than 3 multiple eye bars
F	Suspension or cable elements
G	* Single & multiple cell steel box girders
H	Highly fatigue prone weld details in tension
I	High strength steel girders
K	Details that promote out-of-plane bending (staggered cross frames, etc.)
L	Electroslag welding fabrication procedures
M	Partial length welded cover plates
N	Exposed prestressed tendons
O	Super/sub integral framing details (floorbeam/stringers)
P	Tied arches
Q	Pin connected truss
R	Steel tower span
S	Rigid frames

*Some research indicates a two cell steel box girder bridge is redundant, depending on spacing

Calculated Appraisal Ratings section:

SD Status: - Refer to Appendix BB for a detailed description of SD status determination.

Sufficiency Rating: - Refer to Appendix BB for a summary description of the sufficiency rating program. In the case of temporary or closed bridges, do not run the sufficiency rating program. Due to the load ratings being set to '0' for these bridges, the sufficiency rating program interprets this as missing information and substitutes a default value. This results in an abnormally high sufficiency rating and possibly a SD bridge being coded as non-deficient.

Health Index: - Automatically coded by BrM based on element condition states. The Health Index displayed here is not saved to the database and is not necessarily the same as the Health Index printed on the Bridge Inspection Report, which in generated by Bridge Division during the process of reviewing submitted bridges and importing them into the master oracle database. A detailed description may be found at the following website:
http://www.pdth.com/images/coreelem.pdf

NBI Load Ratings section: To be edited by the inspector for Off System bridges only. For On System bridges, this information is maintained by Bridge Division.

Load Rating Review Recommendation - Check box to indicate inspector recommends the bridge load rating be reviewed. Inspector should also communicate directly with the person who will perform the load rating.

Rating Date - Enter the date the load ratings were last calculated.
Initials - Enter the initials of the person who load rated the bridge.
Alternate Op. Rating Type - Enter the H Operating Rating method
Alternate Op. Rating - Enter the H Operating Rating
Alternate Inv. Rating Type - Enter the H Inventory Rating method
Alternate Inv. Rating - Enter the H Inventory Rating

NOTE: The Operating, Alt. Operating, Inventory and Alt. Inventory rating types should all be the same for any bridge.

Posting Loads section:

Inventory Type 1 - Not used
Inventory Type 2 - Not used
Inventory Type 3 - Inventory rating for truck type 3-3
Operating Type 1 - Not used
Operating Type 2 - Not used
Operating Type 3 - Operating rating for truck type 3-3
SHVs/SU4 - Not used
SHVs/SU5 - Not used
SHVs/SU6 - Not used
SHVs/SU7 - Not used
SHVs/NRL - Not used

INSPECTION > INVENTORY > ADMIN TAB

Structural Identification section:

Agency Bridge ID - DO NOT MODIFY. If changes are required, notify the BrM Administrator.
BRKEY - DO NOT MODIFY. If changes are required, notify the BrM Administrator.
Name - DO NOT MODIFY. If changes are required, notify the BrM Administrator.

Programming section:

Apply Improvement Policy - Not used
Formula Triggers - Not used
Simulation Trace - Not used
SR Calculate Status - Not used

Operation section:

Agency Admin. Area - Select the admin area, as appropriate. Otherwise leave as Unknown. For On System bridges, this field is maintained by the BrM Administrator.

-1/-	Unknown	14	Will Rogers TP
01	County District 1	15	Chickasaw TP
02	County District 2	16	I-40 East (Div. 5)
03	County District 3	17	I-40 West (Div. 5)
04	Cherokee TP	21	Underwater - 2005
05	Cimarron TP	22	Underwater - 2007
06	Creek TP	24	Utility/Pedestrian
07	H.E. Bailey A TP	28	Red River - Texas
08	H.E. Bailey B TP	29	Red River – Oklahoma
09	H.E. Bailey Spur TP	35	GRDA
10	Indian Nation TP	36	Kickapoo TP
11	Kilpatrick TP	37	Gilcrease TP
12	Muskogee TP	38	Kansas Border – KS
13	Turner TP	39	Kansas Border - OK

On/Off Agency System- Select whether the bridge is on or off the Oklahoma highway system.

Bridge Group - Identifies the various inspection contracts and groupings which may be applicable to the bridge.

Structural Notes section:

Structure Notes - Structure notes will not normally change from one inspection to the next. Enter new notes important to the structure. If a bridge requires 'other special' inspections (Item 92c is checked), then the reason or the inspection is stated here. Also, if an 'other special' inspection is no longer required, then the reason is also stated here.

Examples:
- 'Structure contains both span and culvert (or slab and deck) elements'
- 'Roadway Width extended in 2000 to 125' out/out'
- 'Temporary 2-60" CGMP placed 3/2002. Scheduled for replacement FY2005'.
- 'Old U.S. 169-Changed to off system due to realignment.'
- 'This bridge requires an 'other special' inspection due to scour at pier 2'.

INSPECTION > INVENTORY > DESIGN TAB

Deck section:

Deck Area - Deck area for span bridges is computed using deck width, out-to-out (item 52) times bridge length (item 49). (NOTE: The deck area entered on the Condition Tab for a deck element is calculated using roadway width, curb-to-curb (item 51) times bridge length (item 49).) The deck area for a culvert under fill is '0.0'.

Structural Status section:

Bridge Status - Not used
Bridge Lifecycle Phase - Not used

Length section:

Total Length - Enter the bridge total length (structural length (item 49) plus approach slabs, for span bridges only). For culverts, total length is equal to structure length.

Structure Units section:

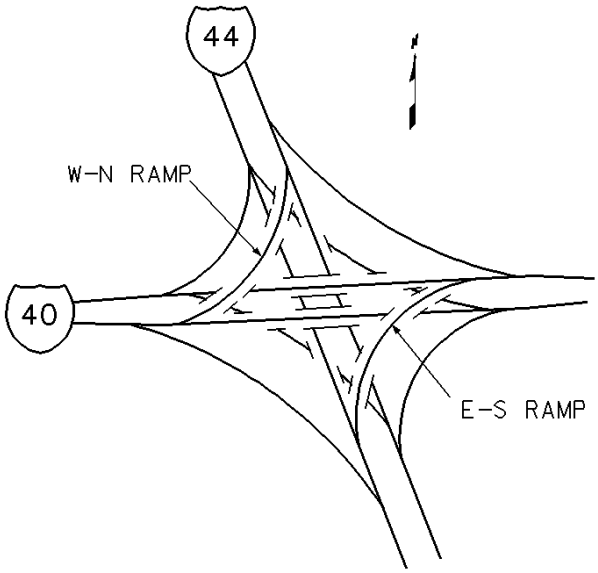
Unit - Do not change from value entered by BrM.
Type - Select main.
Default - Should be 'checked' for the main span and 'unchecked' for an approach span.
Description - Enter a description of the main span.
Notes - Click on the clipboard symbol to open the 'Notes' field. Enter a complete description of the structure, including main and approach spans. Descriptions may be up to 2000 characters long. **Entries in this field are displayed on the Bridge Inspection Report and other reports displaying a bridge description.**

Do not use the 'Add New' button to create additional structure units. They are not used in Oklahoma.

INSPECTION > INVENTORY > ROADS TAB

Identification section:

Road/Route Name - Enter the name of the roadway on or under the structure. Ramps are labeled according to the compass direction of the roadways which make up the ends of the ramp. For example, if the roadway leading into the ramp is to the East of the interchange and the ramp terminates on the roadway to the South of the interchange, then this ramp designation is E-S, as shown in the following example. The direction of vehicular travel is not used to determine the ramp designation.



Traffic section:

Medians - Not Used
Speed - Not Used
ADT Class - Select the ADT class based on item 29.
- ADT Class 1: 1-100
- ADT Class 2: 101-1,000
- ADT Class 3: 1,001-10,000
- ADT Class 4: 10,001-100,000
- ADT Class 5: 100,001+

Alternate Classifications section:

School Bus Rte. (Ck Box) - Not Used (See Oklahoma item 238).
Transit Rte. (Ck Box) - Not Used
Emergency Rte. (Ck Box) - Not Used
NBI Route (Ck Box) - Not Used (but should be 'checked' for all roadways).

Detours section:

Detour Speed - Not Used

Accidents section:

Count/Rate - Not Used

Roadway Notes section:

Enter notes applicable to the route identified in item 005A at the top of the page.

Agency Roadway Fields:

Agency Rdy. Fields 1 – 5 - The following fields (1-5) are to be completed by Bridge Division for each route under a bridge. They are not applicable to routes on the bridge. Most bridges have just a single route under, but some have multiple routes under the bridge (up to 13 routes under). Fields 3, 4 and 5 , are utilized by OkiePROS automated truck routing throughout Oklahoma and for vertical clearance mapping. Complete and accurate data in these fields is imperative for safe Oklahoma travel.

1 - Only coded for under routes (refer to Oklahoma item 263).
U – The under-route at the intersection is a thru route
R – The under-route at the intersection is a ramp which loops under the bridge on a dedicated roadway. If the under ramp merges onto the under thru-route before the bridge, then code as 'U'

2 - Only coded in the case of intersections with vertically intersecting bridges. Cross-reference the NBI number and route indicator of the intersecting bridge and route.

Example (refer to Appendix H, item 7):
NBI numbers 14185 and 14190 intersect with 14190 over 14185. NBI 14190 has one route on (route 1) and 2 under routes (routes A and B). NBI 14185 has one route on (route 1) and one route under (route 2). Therefore, field no. 2 for NBI 14190 route A will read '14185R1' while field no. 2 for NBI 14190 route B will read '14185R2'. Also, field no. 2 for NBI 14185 route 1 will read '14190RA and field no. 2 for 14185 route 2 will read '14190RB'.'

3 - Indicate the compass direction of travel, at a bridge, in which the traffic driving on the route under the bridge would be headed as it moves in the direction of increasing mileage along the highway control section or section line. Enter N, E, S or W for highway direction. Enter N or E only for county roads and city streets.

4 – Enter the actual vertical clearance sign value which corresponds to the direction of travel identified in field no. 3 above. Enter the value in the format '1709' (which represents 17' 9"). If no vertical clearance sign is present on the bridge in the direction of travel, enter an assumed sign value from one of the following assumptions:

a. If the bridge is one of two parallel bridges or one of a set of multiple bridges at an interchange where only one bridge is posted for that direction of travel, enter that sign value for all bridges within that set of bridges.
b. If a bridge is not posted and there is no other bridge nearby, take the minimum vertical clearance measurement for that bridge and subtract 3 inches. Use this value as the assumed posted vertical clearance for this bridge.

If the route under the bridge is one direction only and the direction of travel is in the direction opposite to that identified in field 3, then enter '-1'.

5 – Enter the actual vertical clearance sign value which corresponds to the direction of travel opposite to that identified in field no. 3 above. Enter the value in the format '1709' (which represents 17' 9"). If no vertical clearance sign is present on the bridge in the direction of travel, enter an assumed sign value from one of the following assumptions:

a. If the bridge is one of two parallel bridges or one of a set of multiple bridges at an interchange where only one bridge is posted for that direction of travel, enter that sign value for all bridges within that set of bridges.
b. If a bridge is not posted and there is no other bridge nearby, take the minimum vertical clearance measurement for that bridge and subtract 3 inches. Use this value as the assumed posted vertical clearance for this bridge.

If the route under the bridge is one direction only and the direction of travel is in the same direction identified in field 3, then enter '-1'.

INSPECTION > INVENTORY > AGENCY ITEMS TAB

Agency Bridge Items section (these items will be maintained by Bridge Division):

1. - Not used
2. - Not used
3. - Not used
4. - Not used
5. - Not used
6. - Not used
7. - Not used
8. - Not used
9. - Not used
10. - Not used
11. - Not used
12. - Indicates bridges with LIDAR vertical clearance measurements.
13. - Indicates new/replacement bridges which have been reported to OkiePROS.
14. - Indicates the state agency or consultant responsible for inspecting the bridge.
15. - Indicates the bridge is on a secondary inspection contract or is inspected by a secondary contract as a subcontractor to the primary contractor.

INSPECTION > SCHEDULE TAB

Summary section:

Date Entered - Not used

Inspection Date - By default, the date the inspection is first entered into BrM is displayed. This date should be changed to show the date the inspection was actually performed.

Inspector - Select the name of the team leader who performed the inspection. If this name is not present, inform the BrM Administrator.

Primary Type - Select the type of inspection performed. When a routine inspection is performed in conjunction with another inspection type, do not select 'Regular NBI'. Instead select the inspection type which matches the joining inspection.

- Missing
1 - Regular NBI
B - UW - Wade and probe depth
D - UW - Contract SCUBA
E - UW - Hyperbaric Diving
G - Fracture Critical
O - Special - Other

Inspection Group - Not Used

Entered By - Enter the name of the inspection helper

Engineer of Record - Enter the name of the engineer of record for this inspection

Types of Inspection Performed section:

Routine / Fracture Critical / Underwater / Other Special

- Check the type(s) of inspection performed in the current inspection. The Element inspection type is not used in Oklahoma.

Schedule section:

Element: Current Date/Frequency/Next Date - Not used

Required (Y/N) check box for Fracture Critical / Underwater / Other Special inspection types: Check the box to indicate the associated inspection type is required.

Next Date (1 each for Routine/FC/UW/OS inspections) - Enter next scheduled inspection date based on current date and frequency.

Inspection Resources section:

Next Inspector - Not Used

Bridge Group - Identifies the various inspection contracts and groupings which may be applicable to the bridge.
This data is maintained by Bridge Division. Do not edit.

Crew Hours - Not Used
Flagger Hours - Not Used
Helper Hours - Not Used
Snooper Hours - Not Used
Special Crew Hours - Not Used
Special Equip Hours - Not Used

Schedule Notes section:

Enter any applicable scheduling notes.

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OKLAHOMA BRIDGE ITEMS

(LOCATED UNDER THE ODOT INSPECTION TASK)

The following Items are Oklahoma specific inspection items. They can be located in BrM under the 'ODOT INSPECTION' task and then under one of two subtasks; 'Inspector Items' and 'Bridge Div. Items'. In BrM, the Oklahoma items are scattered throughout the various pages beneath each subtask, however for clarity in this manual the items are presented in numerical order. A parenthetical note for each item will indicate on which screen the item is located.

The inspector is responsible for the accuracy of items under the 'Inspector Items' subtask and the Bridge Maintenance office is responsible for the accuracy of items under the 'Bridge Div. Items' subtask. Items under the 'Bridge Div. Items' subtask are viewable as read-only by the inspector but any errors noted should be reported to the Bridge Maintenance office for correction.

Item 200C: TEMPERATURE (Inspection subtask) **3 Digits**

Enter the temperature (in degrees Fahrenheit) at the time of the inspection.

Item 200D: WEATHER (Inspection subtask) **2 Digits**

Select the type of weather experienced during the inspection:

CL - CLOUDY
CR - CLEAR
PC - PARTLY CLOUDY
RS - RAIN/SNOW

Item 201: STRUCTURAL STEEL ASTM DESIGNATION AND GRADE (Construction subtask)

A. Record the ASTM designation i.e. A7, A373, A36, etc. **4 Digits**
B. Record Grade (yield stress KSI) **3 Digits**

Item 202: NAME OF WATERPROOFING MEMBRANE (Construction subtask)

A. Record the brand name of the membrane used **10 Digits**
B. Record the date the membrane was installed. **10 Digits**

If no membrane was used, leave blank.

Item 203: TYPE OF EXPANSION DEVICES (Inspection subtask) **1 Digit**

Select the types of expansion devices on the bridge:

A. Open Joint - No Device
B. Sliding Plate
C. Finger
D. Armored Joint
E. Steel Reinforced Elastomeric
F. Elastomeric Sheet Type Strip Seal
G. Modular
H. Sealed Expansion Joint
I. Other Type
J. Pourable

Up to three types of expansion devices may be entered. Also enter the date of the most recent joint repair. See Appendix B for more information.

Item 204: TYPE OF RAILING (Inspection subtask) **2 Digits**

Select the type of railing on the bridge. See railing type examples in Appendix B.

01. Thrie Beam
02. Back-to-Back Thrie Beam
03. W-Beam
04. Double W-Beam
05. Back-to-Back W-Beam
06. TR-1
07. TR-3
08. TR-4
09. SFP-1
10. Parapet Retrofit
11. PTR-1 (with round hand rail)
12. PTR-1 (with square hand rail)
13. PTR-2 (with round hand rail)
14. PTR-2 (with square hand rail)
15. HR-3
16. BC
17. A-HR-1
18. BGR-0
19. Metal Railing (other)
20. Concrete Railing (other)
21. F-Shaped Parapet
22. Timber Railing
-1. N/A

Item 205: MATERIAL QUANTITY (Construction subtask) **5 Digits**

Enter the Structural Steel Quantity of the bridge in tons rounded off the nearest 1/10 ton.

Item 208: TYPE OF ABUTMENT AND FOUNDATION (Inspection subtask) 2 Digits

Select the type of abutment and abutment foundation on the bridge: See Appendix B for further information

A. Select the type of abutment on the bridge:
1. Skeleton
2. Pedestal
3. Cantilever
4. Cellular (Modular)
5. Timber Bulkhead
6. Other

B. Select the type of abutment foundation on the bridge:
1. Concrete Piling
2. Steel Piling
3. Timber Piling
4. Drilled Shaft
5. Bears directly on natural foundation material
6. Unknown

In the case of mixed foundation types, select the type most prone to deterioration.

Item 209: TYPE OF PIER AND FOUNDATION (Inspection subtask) 3 Digits

Select the appropriate categories for the following:

A. Record the number of columns per pier or Code 'B' if pile bent. (1st Digit)

B. Select 'Yes' if web exists or if pile bent piling is encased in concrete above ground. (2nd Digit)
Select 'No' if web does not exist or pile bent piling is not encased.
Leave blank if not applicable, for example a single column pier.

C. Select how the footings are supported or what type of piling is used on a pile bent: (3rd Digit)
- N - No piling or drilled Shaft. Footings are bearing on natural foundation
- D - Drilled Shaft, No footings
- C - Concrete piling
- S - Steel piling
- T - Timber Piling

See Appendix B for further information

Item 210: FOUNDATION ELEVATIONS (Construction subtask)

Record the following elevations to the nearest 1/10 foot:

A. Top of footing elevation (highest footing)(use UNK if unknown)	**5 Digits**
B. Bottom of footing elevation (highest footing)(use UNK if unknown)	**5 Digits**
C. Tip of piling elevation (highest)	**5 Digits**
D. Rock Elevation (highest)	**5 Digits**
E. Calculated scour elevation	**5 Digits**

Item 211: SPECIAL WEARING SURFACE PROTECTIVE SYSTEM (Construction subtask)

A. Select one of the following types of surface protective system used on the bridge deck **1 Digit**
- A. Silane
- N. None

B. Enter the date the surface protective system was applied to the deck. **10 Digits**

C. Surface protective system has been reapplied to the deck **Y/N**

D. Enter the date the surface protective system was reapplied to the deck. **10 Digits**

Item 212: HYDRAULIC DATA (Hydraulics subtask)

This data is entered by Bridge Hydraulics. Do not edit.

Item 213: ATTACHED UTILITIES (Inspection subtask)

Select the type of utility attached to the bridge (Up to 7 utilities may be selected):

PR - POWER
CM - COMMUNICATION
PP - PETROLEUM PRODUCTS
WR - WATER
SW - SEWER
NG - NATURAL GAS
OT - OTHER

Item 214: TRAFFIC SERVICES (Inspection subtask)

Enter the requested information for the specific bridge being inspected.

A. Posted weight limit - record weight limit(s) or
RN (required not posted) or
NR (not required) or
CLOSED — 6 Digits

Examples:

Bridge is triple posted for 8, 12 and 16 tons:	Code: 081216
Bridge is single posted at 10 tons:	Code: 101010
Bridge requires posting, but no signs in place:	Code: RN
Bridge does not require posting:	Code: NR
Bridge is closed:	Code: CLOSED

B. Posted speed limit — 2 Digits
- enter speed limit or NR (not required)

C. Narrow or one lane bridge sign (Refer to Appendix G) — 3 Digits
- Select 'No' when no signs are required
- select 'Missing' when signs are required, but one or more sign is missing
- select 'Yes' when signs are required and all signs are present

D. Vertical clearance sign (Refer to Appendix G) — 1 Digit
- Select 'No' when no signs are required
- select 'Missing' when signs are required, but one or more sign is missing
- select 'Yes' when signs are required and all signs are present

Advance warning sign (Refer to Appendix G) — 1 Digit
- Select 'No' when no signs are required
- select 'Missing' when signs are required, but one or more sign is missing
- select 'Yes' when signs are required and all signs are present

E. Navigation lights — 1 Digit
- select Yes (required) or
No (not required)

Navigation lights (working or not working) — 1 Digit
- select Yes (working) or
No (not working)

Item 215: BRIDGE SYSTEM/UNDERPASS SYSTEM (Bridge Div. Use Only subtask) 1 Digit

Select the bridge system which identifies traffic use, both on and under the structure:

A - INTERSTATE
B - STATE HIGHWAY
C - US HIGHWAY
D - ACCO OFF-SYSTEM BRIDGES
H - RAILROAD
I - INCOG (TULSA METRO)
J - KICKAPOO TP
K - PEDESTRIAN
L - UTILITY
M - OTHER
N - SMALL CITIES
O - ACOG (OKC METRO)
P - MUSKOGEE TURNPIKE
Q - CHICKASAW TURNPIKE
R - CREEK TURNPIKE
S - CHEROKEE TURNPIKE
T - TURNER TURNPIKE
U - KILPATRICK TURNPIKE
V - CIMARRON TURNPIKE
W - H.E. BAILEY 'A' TURNPIKE (Incl. Spur)
X - H.E. BAILEY 'B' TURNPIKE
Y - WILL ROGERS TURNPIKE
Z - INDIAN NATION TURNPIKE

Item 216: DESIGN STANDARD (Construction subtask) 35 Digits

Record the superstructure standard(s) when applicable and/or if one or more spans are special designs. If no plans are available, one of the following notations may be used:

City
County
Unknown

Item 218: FUNCTIONALLY OBSOLETE (Inspection subtask) 2 Digits

A bridge inadequate to properly accommodate traffic can be due to inadequate clearances, either horizontal or vertical, approach roadway alignment, structural condition or waterway adequacy. Any posted or narrow bridge would also be included in this category. Enter 'FO' when the bridge is functionally obsolete per the following criteria:

Item 68 (Deck Geometry) <= 3 or
Item 69 (Underclearances) <= 3 or
Item 72 (Approach Roadway Alignment) <= 3 or
Item 67 (Structural Evaluation) <= 3 or
Item 71 (Waterway Adequacy) <= 3

An error check report will indicate if this item is coded correctly.

Item 220: BRIDGE REDECK (Construction subtask)

A - Has the bridge been redecked? (Yes/No) **1 Digit**
B - If yes, enter the year it was redecked. **4 Digits**

Item 221: SUBSTRUCTURE COND. (U/W) (Underwater subtask) 1 Digit

Select the condition of the part of the substructure that is underwater. (Underwater inspectors only)

9 - Excellent Condition
8 - Very Good Condition
7 - Good Condition
6 - Satisfactory Condition
5 - Fair Condition
4 - Poor Condition
3 - Serious Condition
2 - Critical Condition
1 - Imminent Failure
0 - Failed Condition
N - Not Applicable

The condition language is the same as the language for items 58, 59, and 60.

Item 222: FILL OVER RCB/ARCH (Inspection subtask) 2 Digits

Record to the nearest foot the estimated depth of embankment over the RCB or arch. Fill over an arch is measured at the apex of the arch. If the RCB is at-grade, code AG. If the fill over the RCB or arch is two ft. or less, code FG. If the fill is over two ft., code the amount of fill.

Item 223: APPROACH ROADWAY CONDITION (Inspection subtask) 1 Digit

Rate the condition of the approach roadway to the bridge. Approaches may consist of concrete, asphalt, gravel, or dirt. Such items as approach shoulders, guardrails, drainage basins or gutters, and pavement joints will not influence the rating number unless the condition of any one of these items is adversely affecting the approach roadway condition. The determination of rating shall be based on the condition of the worst approach roadway and pavement expansion joints, if provided.
The reinforced concrete approach slab is rated using element 321. Approach alignment is rated in item 72. These items are not to be considered in rating this item.

0 Unknown

1 Excellent Condition - no noticeable or noteworthy deficiencies which affect the condition of the approach roadway. The asphaltic, concrete, gravel or dirt approach provides a smooth transition onto the bridge. Minor cracking, rutting, or shoving may exist.

2 Good Condition - minor settlement of concrete or asphalt approach which doesn't provide a smooth transition onto the bridge. Moderate cracking, rutting, or shoving may exist. Gravel or dirt approach is low or has small chug holes requiring some fill material. Traffic doesn't need to reduce speed as the bridge is approached.

3 Satisfactory Condition - concrete or asphalt approach that has moderate settlement and/or cracking. Significant rutting, or shoving may exist. Gravel or dirt approach is low or has moderate chug holes requiring fill material. Traffic may slow down as the bridge is approached.

4 Poor Condition - concrete or asphaltic approach slab that has significant settlement and cracking. Extensive rutting, or shoving may exist. Gravel or dirt approach is low or has chug holes requiring fill material. Traffic slows as the bridge is approached.

5 Serious Condition - Approach has severely deteriorated due to settling, potholes, cracking, shoving, etc. Traffic must significantly reduce speed as bridge is approached.

Item 225: COATING TYPE AND OVERCOAT SYSTEM (Inspection subtask)

Select the initial coating type and overcoat system applied to any steel (superstructure, substructure or other) element of the bridge:

Initial Paint System

1 - Not applicable
2 - Red lead ready-mixed paint three (3) coat system (top coat - silver)
3 - Unknown
4 - Inorganic zinc two coat paint system (top coat – brown, yellow, blue, tan)
5 - Inorganic zinc three coat paint system (near-white prep)(IZ-E-U)(non-lead)(top coat - gray)
6 - Organic zinc(OZ-E-U) (top coat - gray)
7 - Moisture Cure (SC-MC-U) (top coat - gray)
8 - Weathering Steel (no paint)
9 - Weathering Steel (paint on beam ends and/or outside beam)
_- _

Paint systems 5, 6 and 7 will be used to repaint an existing structure where full removal near white surface preparation is required. Paint system 5 is required when painting new steel. New steel bridges generally use unpainted weathering steel. Standard Specification, Section 512.04B.(7) requires paint type, manufacturer, contractor and date to be stenciled inside of the exterior girder on the SW corner for newer paint projects.

Overcoat System

0 - Not applicable
1 - Tri-F (Black Gold)
2 - Epoxy Mastic w/ or wo/ urethane top coat
3 - Moisture Cure (SC-MC-U)
4 - Calcium Sulfonate / Alkyd
9 - Other

(This information will be captured during construction.)

Item 226: YEAR PAINTED (Inspection subtask) 4 Digits

Enter the year the bridge was painted. If unknown, enter the year of bridge construction. If weathering steel, enter the year of bridge construction.

Ex: 1995 (August, 1995)

(This information will be captured during construction.)

Item 227: PAINT COLOR (Inspection subtask) 10 Digits

Select the appropriate paint color applied to the bridge. When more than one color is applied to a bridge, select the predominant color.

Black	Gold	Maroon	Silver	White
Blue	Gray	Neutral	Tan	Yellow
Brown	Green	Red	Weathering	

Item 228: CONCRETE COVER (Construction subtask) 2 Digits

Enter the amount of concrete cover over the deck reinforcing steel to the nearest inch.

(0.0 = NOT APPLICABLE)

(This information will be captured during construction.)

Item 229A/B: DECK AIR ENTRAINED/PERCENT AIR ENTRAINED (Construction subtask) 3 Digits

Select whether or not the deck was air entrained, then enter the percentage of air entrainment.

A. Deck Air Entrained: Select 'Yes' or 'No'.
B. If yes, enter percent of Air Entrained: Enter the percentage (3 digits).

(This information will be captured during construction.)

Item 230: 28 DAY STRENGTH Construction subtask) 4 Digits

Enter the 28 day strength of the deck concrete. (This information will be captured during construction.)

Item 231: COARSE AGGREGATE FREEZE/THAW DURABILITY FACTOR (Construction) 4 Digits

Enter the freeze/thaw durability factor: (This information will be captured during construction.)

Item 232: COARSE AGGREGATE GRADIATION FOR DECK (Construction subtask) 3 Digits

Enter the Coarse Aggregate Gradation Number: ### (EX: 003, 357, 057, 067 or 007)

(This information will be captured during construction.)

Item 233: DECK FORMING (Inspection subtask) 1 Digit

Select the appropriate deck forming method used on the bridge.

A. Conventional Forming
B. Permanent Metal Deck Forms (PMD) (Stay-In-Place)
C. P/S Concrete Panels (Stay-In-Place)
D. Other
E. Plastic/Clear Panels (Stay-In-Place)

Item 234: LOCAL ID (Inventory subtask) 10 Digits

This Item is used at the county's discretion.

Item 237: GALLOPING BARS IN DECK (Construction subtask) 1 Digit

Select whether or not galloping bars were placed in the deck.

Y Yes, has galloping bars
N No, does not have galloping bars

(Galloping bars will only be found on older bridge decks.)

Item 238: SCHOOL BUS ROUTE (Inventory subtask) 1 Digit

Select the appropriate school bus route information for the route on the structure.

0 - Not on a desired or current route, or undetermined
1 - Current Bus Route
2 - Desired Bus Route
3 - Current and Desired Bus Route

For the state highway system, all bridges shall be coded as both current and desired bus routes unless the bridge is load rated at less than 15 tons. Then it shall be coded as a desired route.

Item 239: DECK CURING AGENT (Construction subtask) 1 Digit

Select the curing agents used to the cure the concrete deck shortly after it was poured. (Up to three deck curing agents may be selected

A - Linseed oil emulsion
B - Polyethylene
C - Three layers of wet burlap
D - Wetted cotton mats
E - Red curing compound
F - White pigment curing compound
G - Water
H - Fogging
I - Other
J - None

(This information will be captured during construction.)

Item 240: APPROACH ROADWAY TYPE (Inspection subtask) 1 Digit

Select the paved status of the approach roadway to the bridge. It was developed to help local governments identify the importance of the route under consideration and affects the county bridge replacement selection list.

1 - Concrete
2 - Asphalt/bituminous (including chip seal)
3 - Gravel
4 - Soil

Item 243A/B: GIRDER SPACING (Inspection subtask)

A. Enter the average girder spacing for the bridge to the nearest tenth of a foot. **3 Digits**
B. Enter the number of girders **2 Digits**

Item 244: SPAN LENGTH (Inspection subtask) 3 Digits

Enter the individual lengths of all the different spans on a bridge to the nearest foot. (It has the capacity for 8 span lengths.)

Item 245: GIRDER DEPTH (Inspection subtask) 4 Digits

Enter the average girder depth for the bridge to the hundredth of a foot. This item has been added primarily as an aid in estimating paint quantities and costs.

Item 246: TYPE OF OVERLAY (Inspection subtask)

A. Select the overlay wearing surface on deck/slab type structures. Check the coding of item 108a to ensure item 108a and item 246a are compatible. **1 Digit**

(This item may also apply to at grade culverts.)

1 - AC Overlay
2 - Chipseal
3 – Timber Running Planks
4 - Soil
5 - Latex Modified Concrete Overlay
6 - High Density Concrete Overlay
7 - Reinforced Concrete Overlay
8 - Rapid Set Latex Modified Concrete Overlay
9 - Polymer Concrete Overlay
0 – Silica Fume Concrete Overlay
_ - N/A

B. Enter the overlay thickness to the nearest 0.5 inch. **3 Digits**

EXAMPLE:	MEASURED	CODE
	3.25"	03.5
	3.00"	03.0
	2.50"	02.5

C. Enter the date the overlay was applied to the deck/slab. **10 Digits**
If unknown, use date of inspection where overlay first appeared
EXAMPLE : 10/23/2003

D. Indicate whether the overlay thickness has increased or decreased by 1" or more (Yes/No) **1 Digit** relative to the overlay thickness prior to the date specified in item 246c.

This information is used to calculate the dead load on the structure to determine the load ratings and to permit over-weight vehicles. Whenever the overlay thickness varies by 1" or more, the bridge load rating should be recalculated. Do not use this item for culverts under fill. Instead use item 222.

Item 247: PROTECTIVE SYSTEMS (Construction subtask)

Select the system used to protect the bridge deck/slab (up to 5 systems may be selected). **1 Digit**

A – Deck Penetrating Waterproof Repellant (DPWR)/Epoxy Coated Bars
C - Epoxy Coated Bars (Can be identified by referring to the plan pay items.)
D - Galvanized Bars
E - Membrane
F - Weathering Rebars
G - Stainless Steel Bars
H - Stainless Steel Clad Bars
J - Working Cathodic Protection System
K - Chemical Inhibitor
O - Imbedded Galvanic Anode

Item 248: NUMBER OF FIELD SPLICES WITH SEVERE CORROSION (Inspection subtask) 2 Digits

Enter the number of steel field splices with severe corrosion.

Item 249: SCOUR CRITICAL POA EXISTS IN THE FILE AT ODOT (Inventory subtask) 1 Digit

Refer to Appendix JJ to determine when a Scour POA is required.

A. Indicate whether a scour POA is required and exists on file at ODOT as follows:

\- Scour POA is not required and is not applicable
No – Scour POA is required but does not exist
Yes – Scour POA is required and does exist in the file at ODOT

B. Enter a detour route for the structure which cannot also be closed by the same storm event which caused this bridge to close.

Item 250: CULVERT HEADWALL-TO-HEADWALL DISTANCE (Inspection subtask) 5 Digits

Enter the inside distance between the culvert headwalls to the nearest tenth of a foot. The distance is measured perpendicular to the roadway at the narrowest point. If the distance is greater than 999.9 ft., then enter 999.9. (Federal Items 51 or 52 cannot be used to determine this dimension due to the proper entry for a culvert under fill is '0.0'.)

Item 251: HOUSE DISTRICT (Bridge Div. Use Only subtask) 5 Digits

Enter the House District (1-100) in which the bridge is located (for Bridge Management use only).

Item 252: SENATE DISTRICT (Bridge Div. Use Only subtask) 4 Digits

Enter the Senate District (1-50) in which the bridge is located (for Bridge Management use only).

Item 253: U.S. HOUSE DISTRICT (Bridge Div. Use Only subtask) 4 Digits

Enter the U.S. House district (1-42) in which the bridge is located (for Bridge Management use only).

Item 254: CULVERT EXEMPT FROM LOAD RATING (OkiePROS subtask) 1 Digit

Select whether the culvert is exempt from load rating due to having been in service for an appreciable amount of time with no overload issues. Normally the load rating would require the culvert to be posted. For on-system culverts only. Determined by the load rater.

0 - No
1 – Yes

Item 256: CHANNEL PROFILE MEASUREMENTS TAKEN UPSTREAM OR DOWNSTREAM 1 Digit (Channel Profile subtask)

Select which side of the bridge the channel profile measurements were taken from.

1 Upstream
2 Downstream

Item 257: OKIEPROS AUTOMATIC TRUCK ROUTING (OkiePROS subtask)

Select whether the bridge meets the following criteria in aid of the OkiePROS automated truck routing program.

A. Consider this bridge for OkiePROS truck routing (Yes/No) or Culvert **1 Digit**
B. This bridge passes OL-1 truck criteria (Yes/No) **1 Digit**
C. This bridge passes the 120K Lb. Criteria (Yes/No) **1 Digit**
D. Virtis assesses this bridge type (Yes/No) **1 Digit**
E. This bridge is in Virtis **1 Digit**

0 - No
1 - Yes
2 - Other software to assess bridge
3 – No other software in place (GK)

Item 258: PLANS SHOWING FOUNDATION EXIST IN THE FILE AT ODOT (Inventory subtask) 1 Digit

Select whether the bridge file at ODOT contains plans showing the bridge foundation.

0 - No
1 – Yes

Item 259: LEVEL OF SCOUR EVAL. REPORT EXISTS IN THE FILE AT ODOT (Inventory subtask) 1 Digit

Select whether the bridge file at ODOT contains a level of scour evaluation report.

0 - No
1 – Yes

Item 262: BRIDGE REMOVED FROM INVENTORY DUE TO 5+ YEARS CLOSED/TEMP 1 Digit
(Bridge Div. Use Only subtask)
Select if the bridge was removed from the state inventory because it has been closed or temporary for the last 5 or more consecutive years. Select 'Keep' when the bridge owner has reviewed the bridge location and does not want the bridge removed from the inventory.

0 - No
1 - Yes
2 - Keep

Item 263: INTERCHANGE AT INTERSECTION (OkiePROS subtask) 1 Digit
Select the type of interchange at the intersection of two or more inventory routes.

0 - No Interchange at overpass
1 - Partial Interchange at overpass
2 - Full Interchange at overpass

Item 264: INTERSTATE MILEPOINT (Bridge Div. Use Only subtask) 5 Digits
Enter the mile point of the bridge (up to 999.99 miles.) corresponding to mileage signs posted along the interstate.

Item 266: RIDING SURFACE ROUGHNESS (Bridge Div. Use Only subtask) 1 Digit
Select the evaluated roughness factor which represents the worst of the conditions for the bridge deck surface, the approach surface, and the expansion joints.

1 - Smooth – Smooth riding surface at the approaches, bridge deck, and expansion joints. Should only be applied to bridges with excellent riding surface condition and geometry (dynamic load allowance 10% or less)
2 - Average – Minor surface deviations or depressions. (dynamic load allowance greater than 10% but less than 20%)
3 - Poor – Significant deviations in the riding surface at the approaches, bridge deck surface (patchwork), and expansion joints. (dynamic load allowance greater than 20% but less than 33%)
_ - N/A

The following information may be found on the various data entry screens under the ODOT INSPECTION task and its various subtasks. They do not have an Oklahoma item number assigned, however they do present information applicable to bridge inspection. Some of the fields are editable while others present information is a read-only format.

ODOT INSPECTION > INSPECTOR ITEMS > INVOICE SUBTASK

Enter the following invoice information for all bridge inspections paid by invoice:

Invoice number – Enter the invoice number used for inspection data submittal and claim for payment.
Billing date – Enter the date to appear on the invoice as the date the invoice is submitted for payment.

Team Leader Approval checkbox and initials.
Program Manager Approval checkbox and initials.
Division 1-8 Approval checkbox and initials.
Bridge Maintenance Approval checkbox and initials.
Bridge promoted indicator.

ODOT INSPECTION > INSPECTOR ITEMS > INVENTORY SUBTASK

Structure No. – This item is read-only. If change is required, contact the Bridge Maintenance Office.
Scour POA Detour Route – Enter scour detour information as described in the BrM Office Manual, Appendix JJ

ODOT INSPECTION > INSPECTOR ITEMS > INSPECTION SUBTASK

ROADWAY NOTES
Enter any roadway applicable notes observed during the inspection.

FLOWLINE NOTES (UW STREAMBED / SCOUR NOTES)
This is where you enter flowline measurements. This measurement is recorded for each inspection of any bridge over water, Also describe any flowline characteristics such as flowline aggradation; degradation; channel meandering or shifting towards an abutment or pier; erosion or sloughing of the banks; size and depth of scour holes ....etc.
For underwater inspections, this field is for entry of streambed and/or scour notes.

MISCELLANEOUS INSPECTION NOTES (UW RECOMMENDATIONS)
This item is a supplemental field for inspection notes that the inspector may deem appropriate but which do not fit into any other category or field. Currently this field is not displayed on any BrM reports. Do not use this field for any flowline or scour notes.
For underwater inspections, this field is for entry of recommendations the inspector may have regarding the underwater elements.

ODOT INSPECTION > INSPECTOR ITEMS > CHANNEL PROFILE SUBTASK

This is where you enter detailed channel measurements when item 113 (Scour Critical) is 3 or less (see item 113 in Appendix C). Take and record channel profile measurements as indicated on the next page. Channel profile measurements are important for span bridges which risk loss of a substructure element. For culverts, a channel profile isn't required, but flowline degradation and undermining measurements are required. It is very important to obtain measurements at the following locations:

- Each foundation unit (abutment / pier)
- Where slope grade changes,
- At all edges of water,
- At maximum depth of water,
- Edges and highpoint of debris piles,
- Other locations that could change over time and are not incorporated in the measurements above.

The inspector should identify where the measurements are taken from. (The upstream or downstream side of the bridge, top of rail, top of curb, distance from the abutment, etc.) Measurements should always be taken on the same side as all previous inspections so that a comparison can be made. They can be taken on the upstream or downstream side of the bridge, but as a rule of thumb, they should be taken on the side that shows the most scour, degradation, or other channel properties that may cause distress to the foundation units. If a scour hole needs to be documented on the upstream side and all prior inspections are from downstream; the inspector needs to measure and describe the problem and also should document the side of the bridge that the profile measurements were taken and notify the program manager.

When making notes for bridges with multiple spans, piers, beams, etc. it is necessary to establish a common reference point to avoid confusion when these notes are read by others. Referencing of multiple spans, piers, beams, etc. should always increase in a South-to North or West-to-East direction. Thus, for example, pier 1 of 5 would always be the western-most or southern-most pier. (A few inspectors may remember referencing off system bridges in a North-to-South direction since this is how the section lines increase, beginning at the Oklahoma/Kansas state line. This is no longer the case.) Similarly, taking of channel profile, or flowline, measurements should always be done in a South-to-North or West-to-East direction.

Program managers reviewing inspections should plot any channel profiles taken on as built plan sheets and new ground lines should be drawn for each inspection where the measurement changes one to three feet. Notify the engineer of any changes in profile that change or have short term potential to change exposure of foundation units.

This section provides a way to enter channel profile measurements into BrM for piers, flowlines, debris, etc. Space is provided for up to 20 channel profile measurements per bridge. See Flowline Notes, above, to indicate whether the channel measurements are taken upstream or downstream and where the measurements are to be taken.

Upstream/Downstream: (see item 256)
Select where the channel profile measurements were taken from.
1- Upstream
2- Downstream

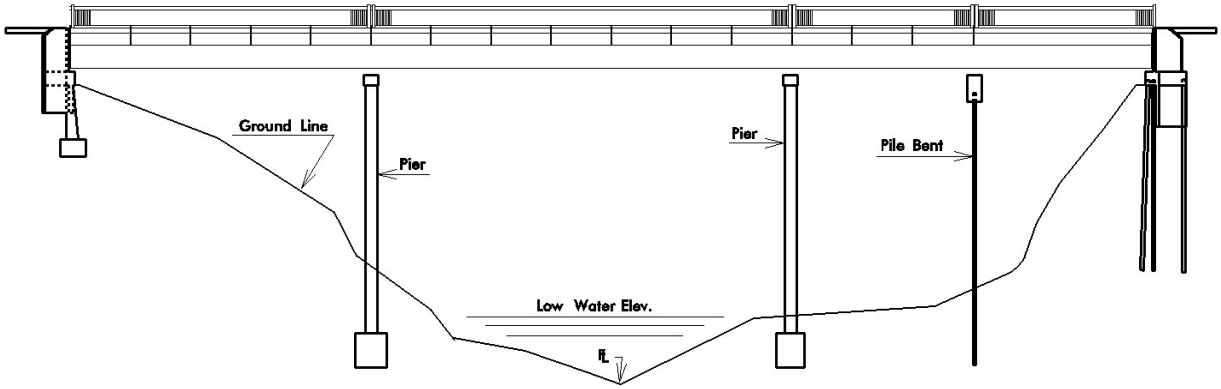
Distance from beginning of bridge to baseline:
Enter '0' if measurement begins at the abutment. For long bridges with no significant events to measure near the abutment, enter a horizontal distance (up to 999.9 ft.) from the abutment to baseline reference point. All other profile measurements will be made from this point.

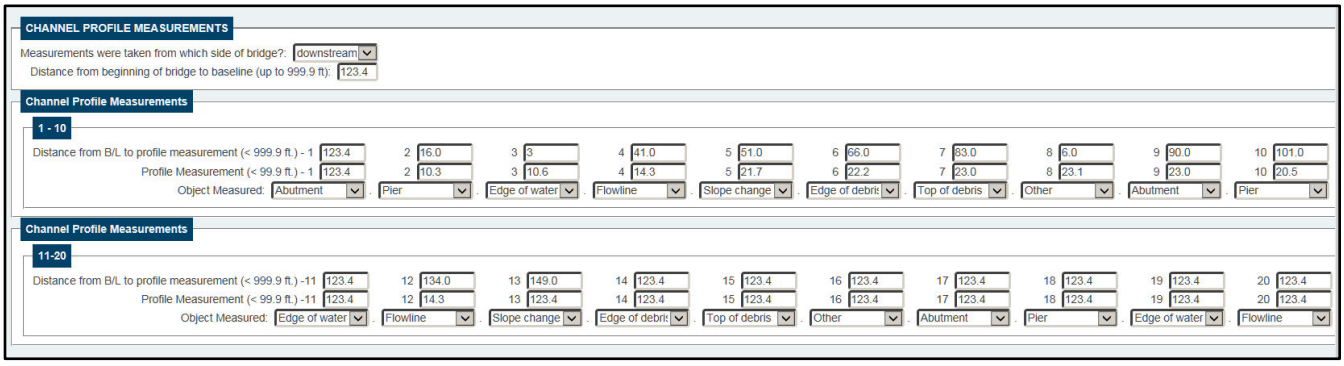
Distance from baseline to point of profile measurement:
Enter the horizontal distance (up to 999.9 ft.) from the baseline reference point (e.g., abutment) to the object being measured.

Profile measurement:
Enter the vertical distance (up to 99.9 ft.) from the point of reference (bridge deck, top of curb, etc.) down to the object being measured. Enter the value as a positive number.

Object Measured:
Select the object to which the measurement is taken:

1- Abutment
2 -Pier
3- Edge of water
4- Flowline
5- Slope change
6- Edge of debris
7- Top of debris
8- Other





ODOT INSPECTION > INSPECTOR ITEMS > UNDERWATER SUBTASK

For underwater inspections only. Enter condition states and notes for all substructure elements where the water depth at normal flow is greater than 5'-0" and the bridge has been included in an underwater inspection contract. Due to the number of fields required, condition state data for only 15 piers can be entered per report. For bridges with more than 15 piers, create a new inspection for each group of 15 piers.
For each pier group, select the appropriate grouping:

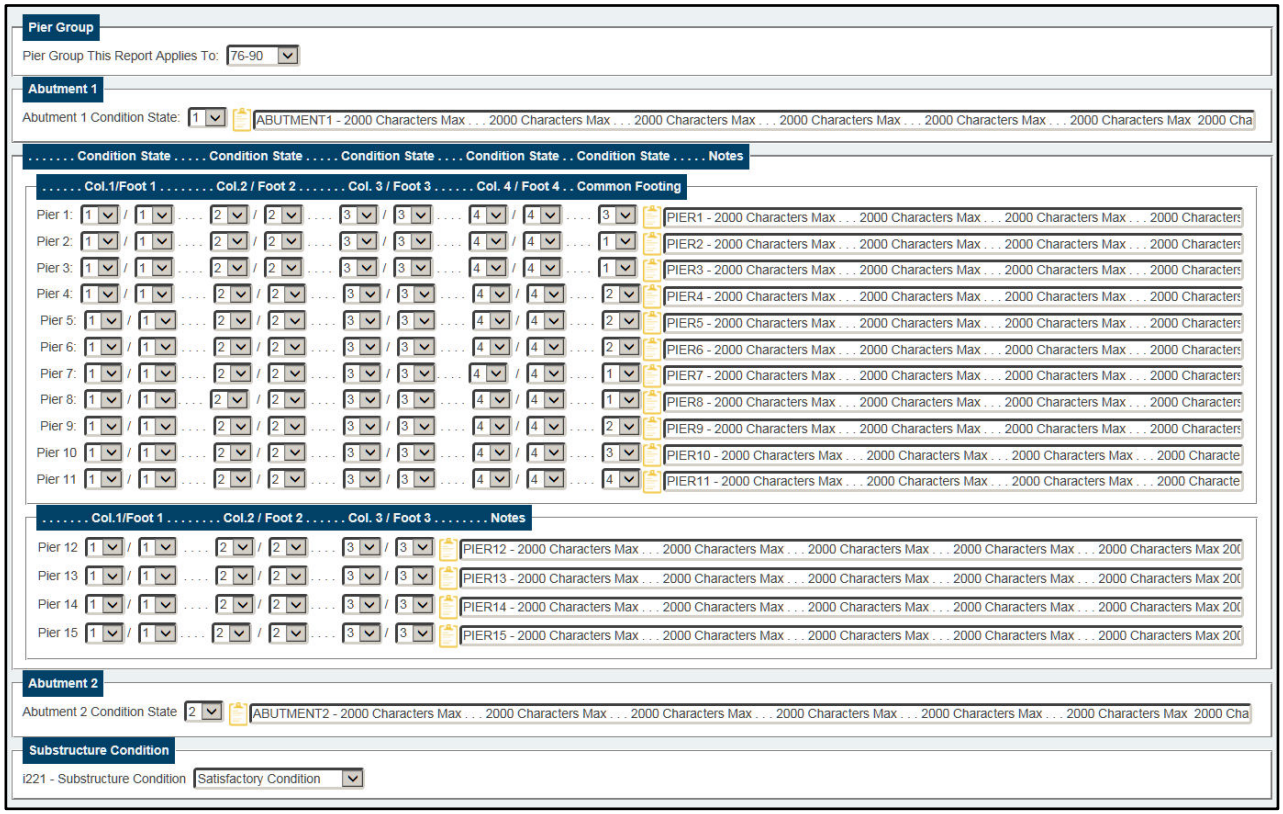
1 - 1-15
2 - 16-30
3 - 31-45
4 - 46-60
5 - 61-75
6 - 76-90.

Each underwater inspection (as many as 6 inspections for the longest bridges) must have a different date. When multiple inspections are required for pier groups on a long bridge, adjust each pier group inspection date backwards from the day of inspection in order that the last pier group inspection date equals the day of the actual inspection. This is required for BrM to function properly.

Abutment 1(2)
Condition State (and Notes): Select condition state 1-4, as appropriate. Enter related notes (up to 2000 characters).

Pier 1-15 Columns/Footings (and Notes): Select condition state 1-4, as appropriate for up to 4 columns per pier. Enter related notes (up to 2000 characters). Data entry fields are provided to accommodate piers with either separate or common footings.

Substructure Condition: Refer to description for ODOT Item 221.



ODOT INSPECTION > BRIDGE DIV. ITEMS > BRIDGE MGMT. USE ONLY SUBTASK

Bridge Management

Do not edit these fields. These fields are for internal use by the Bridge Management office.

Brmgt1:	Brmgt5:	User_fld1:
Brmgt2:	Brmgt6:	User_fld2:
Brmgt3:	Brmgt7:	User_fld3:
Brmgt4:	Brmgt8:	
Brmgt9:	Brmgt13:	User_num1:
Brmgt10:	Brmgt14:	User_num2:
Brmgt11:	Brmgt15:	User_num3:
Brmgt12:	Brmgt16:	

Bridge Maintenance

All Bridges (Required)

These Items are for Bridge Maintenance use only and are not to be edited by Inspectors

STATUS

Select the current status of the bridge in the Oklahoma Inventory:

- I - In-Service
- F - Future
- R - Removed From Inventory (A bridge which has been removed from the inventory will remain in the Oracle database)
- V - Void (An invalid or duplicate bridge record)
- T – In-service bridge that has not received an initial inspection, but traffic is either on or under the bridge.

INVENTORY ROUTE

Select the service category of the selected route; on or under the bridge. A bridge may have multiple routes on or under the structure. Each route rates its own inventory route category. Only one route may be Primary and every bridge must have a Primary route. The primary route is determined using a strict hierarchy where the highest priority route from the following list is used: Interstate, non-interstate turnpike, US Highway, state highway (includes interstate frontage roads and business routes), county road, city street, other. In the event there are two interstate routes at a bridge, the numerically lower interstate number will be the primary route. In the event of concurrent US or state highways, an NHS route will have precedence over a non-NHS route.

- P – Primary route
- S – Secondary Route (State)
- C – Secondary Route (County)

ODOT COUNTY

Select the county the structure is located in.

CONTROL NO.

Enter the control number for the section of highway where the bridge is located. For on-system bridges, the control number is obtained from the Control Section Map book. For off system bridges the control number is ‘000’. For additional guidance, refer to the Federal Coding Guide

CONTROL SUFFIX

Select the control suffix of the selected route; on or under the bridge. A bridge may have multiple routes on or under the structure. Each route rates its own suffix

- blank. In-service mainline bridge
- F Frontage Road
- R Ramp
- T Turnpike owned bridge

MILEPOINT
Enter the milepoint of the selected route; on or under the bridge. A bridge may have multiple routes on or under the structure. Each route rates its own milepoint. Milepoints for on-system bridges are determined using the Control Section Map book. Determine the distance of the bridge from the indicated beginning of the control section. For off-system bridges, the milepoint will be '00X00', where 'X' is the last digit of the structure number (e.g., 55N1234E5670008)

PHYSICAL COUNTY
Select the county the structure is located in. In the event a neighboring division and / or county inspects and maintains the structure, that information will be recorded on the inventory/admin tab.

PHYSICAL DIVISION
Select the division that the structure is located in. In the event a neighboring division and / or county inspects and maintains the structure, that information will be recorded on the inventory/admin tab.

On System Bridges (Required)
In the case of on-system parallel bridges, enter the compass direction which best represents the directional relationship of one bridge to the other (e.g., if one bridge is to the north, the other bridge will be to the south).

Blank	not a parallel bridge
N	The indicated bridge is physically north of the opposite bridge.
S	The indicated bridge is physically south of the opposite bridge.
E	The indicated bridge is physically east of the opposite bridge.
W	The indicated bridge is physically west of the opposite bridge.

Off System Bridges (Required)
Enter the section line designation for the bridge using ODOT published county maps to determine the north and east milepoints to the nearest tenth of a mile. The first segment refers to the directional section line for the route on the bridge. The second segment refers to the crossing section line

GRIP Longitude/Longitude

Grip Latitude –	Enter high precision latitude
Grip Longitude –	Enter high precision longitude

General

Bridge Fund Source
This Item is for Bridge Division use only and is not to be edited by Inspectors. Indicates funding source for bridge repair/replacement projects.

ISTAT	Interstate System bridges
NHS	National Highway System bridges
STP-S	State bridges not on an Interstate or NHS route
STP-C	Off System bridges

Accident Count Fatal -	Not used
Accident Count Injury -	Not used
Accident Count Non-Injury -	Not used

ODOT INSPECTION > BRIDGE DIV. ITEMS > HYDRAULICS SUBTASK
This data is entered by the Bridge Hydraulics office. Do not edit.

ODOT INSPECTION > BRIDGE DIV. ITEMS > OkiePROS SUBTASK
This data is entered by the Bridge Maintenance office. Do not edit.

ODOT INSPECTION > BRIDGE DIV. ITEMS > PROJECT SUBTASK

PROJECT INFORMATION

Enter the following project information for all new bridges and all rehabilitation projects on each bridge. (This information should be captured during construction.)

ORIGINAL PROJECT

Item241: Job Piece No.	**5 Digits/2 Digits**
Item206: Project No.	**15 Digits**
Project Cost:	**6 Digits**
Contractor:	**15 Digits**
In-House or Consultant	**10 Digits**

1ST RECONSTRUCTION / REHAB PROJECT

Item242a: Job Piece No.	**5 Digits/2 Digits**
Item207a: Project No.	**15 Digits**
Project Cost:	**6 Digits**
Type of Work:	**15 Digits**

2ND RECONSTRUCTION / REHAB PROJECT

Item242b: Job Piece No.	**5 Digits/2 Digits**
Item207b: Project No.	**15 Digits**
Project Cost:	**6 Digits**
Type of Work:	**15 Digits**

PROJECT NOTES

Enter any notes applicable to original or reconstruction.

PROGRAM INFORMATION

This information is presented as read-only and is not editable.

JPINFO Program 1(2) Information

This information is imported into BrM to record future projects with a NBI number reference.

ODOT INSPECTION > BRIDGE DIV. ITEMS > CONSTRUCTION SUBTASK

This information is collected during construction or rehab projects and is best obtained from plans and other documents.

Appendices

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APPENDIX A
QUESTIONS AND COMMENTS

Comments:

C1. There is a tendency to estimate the quantities for each of the condition states. The emphasis needs to be for accurate, not "eyeballed", quantities.

C2. Railroad, utility and pedestrian bridge crossing over public roads do not need element inspections, but the inspection should still note horizontal and vertical clearances and any significant damage, traffic impact, etc.

C3. Any element with a blank environment will be assigned in accordance with Appendix AA.

C4. If there needs to be clarification on the condition state language, please make a recommendation of what you think it should say.

C5. If an element doesn't fit any of the established elements, have a full description (Situation, Quantities, Condition) in the Comments , then contact the Bridge Division Maintenance Office and we will determine the best fit for the element in question.

C6. Include the skew angle in quantifying all quantities for superstructure, substructure and joint elements.

C7. Whenever an unusual condition exists for a structure (e.g., two different deck types or an RCB with deck and superstructure elements) make an entry into the Structure Notes explaining the unique situation. This helps to prevent confusion when bridge inspection reports are read by persons other than the inspector.

C8. A concrete frame structure may be classified as either a bridge or a culvert depending on whether the slab is integral with the exterior walls and whether the exterior walls retain earth pressure. If the slab is integral with the exterior walls and there is earth pressure on the exterior walls, the structure is coded with a culvert element. Otherwise, code it with concrete slab, soffit and concrete abutment elements.

C9. If an element is removed during a new inspection, but is to remain for all previous inspections, merely delete it from the new inspection in the working database. The new inspection does not yet exist in the Master database, therefore no special action is required. If it is found that any element must be removed from previous inspections in BrM, do not merely remove the item from the working database. To correctly remove an element in this case contact the BrM Administrator. Also, if an inspection, roadway or structure unit needs to be deleted, contact the BrM Administrator.

C10. For any bridge with an ADT of less than 24, enter the ADT as 24.

C11. Inspector’s notes are required for all elements in condition state 3 or worse, all Smart Flags and all PX or CX repair recommendations. Notes should include, among other things, the size and location of major distressed areas.

C12. Dated photographs are required for all elements with PX or CX repair recommendations.

C13. Notes should describe the problem, location and size and not provide recommended repairs or solutions.

C14. When a bridge has been replaced with a temporary structure (e.g., steel CGMP) do not remove the elements for the original structure and do not add any elements for the temporary structure. Place all original elements in their worst condition state and describe the temporary structure in the Structure Notes field. Follow the guidance for item 103 in the FHWA Coding Guide.

C15. Bridges on private roads or driveways (normally used by just one or two persons) are not inventoried or maintained by the state.

C16. Post-tensioned concrete should be coded as pre-stressed concrete.

C17. Creek names entered into BrM as the Feature Intersected must match the United States Geological Survey (USGS) map names when there is a conflict with ODOT and local maps. One allowable exception to this rule is in the case of offensive names which have been changed by legislative action to an alternate, inoffensive name. This new name may be used in lieu of the USGS mapped name.

Questions:

Q1. What is the difference between a Smart Flag and an element?
A1. An element has a recommended action (possibly - do nothing) for each condition state. Smart flags indicate the bridge has deficiencies that are difficult to model because deterioration rate or cost factors vary to the degree that BrM cannot make sound economic decisions.

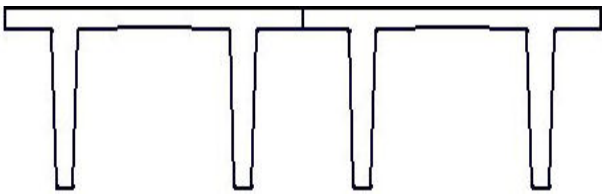
Q2. How do I determine whether an overhead utility structure requires an NBI number?
A2. Overhead pipes, wires and signs are normally not assigned NBI numbers. If a structure exists to house or support the pipe or wire utility, then the structure may require an NBI number where vertical and horizontal measurements would be monitored on a 24 month inspection cycle. The minimum requirements which must be met before the structure can be added to the bridge inventory are:
1) The structure must be over at least one traffic lane of an inventory route, and
2) The structure must be self-supporting, independent of the utility, and
3) The structure would most likely remain in place if the utility were removed.

Q3. Why does Oklahoma post vertical clearances on every bridge?
A3. According to Oklahoma law (OK. State Statues, Title 47, Chapter 14, Subsection 14-114), in the event that a bridge is struck by an over-height vehicle, Oklahoma can collect damages only if the bridge is legibly and correctly signed stating the vertical clearance in feet and inches for each direction of travel beneath the structure. In other words, if a bridge is struck by an over-height vehicle and the bridge is not posted with the correct vertical clearance, then the Oklahoma state, county or city bridge owner cannot collect damages even if the vehicle driver is clearly at fault.

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Deck Elements

12 – Reinf. Conc. Deck



15 – P/S Conc. Top Flange
(Off System only-not many in OK)

28 – Steel Deck-Open Grid

30 – Steel Deck-Orthotropic

31 – Timber Deck

38 – Reinf. Conc. Slab

54 – Timber Slab
(Off System only-not many in OK)

859 - Soffit

843–P/S Conc. Slab

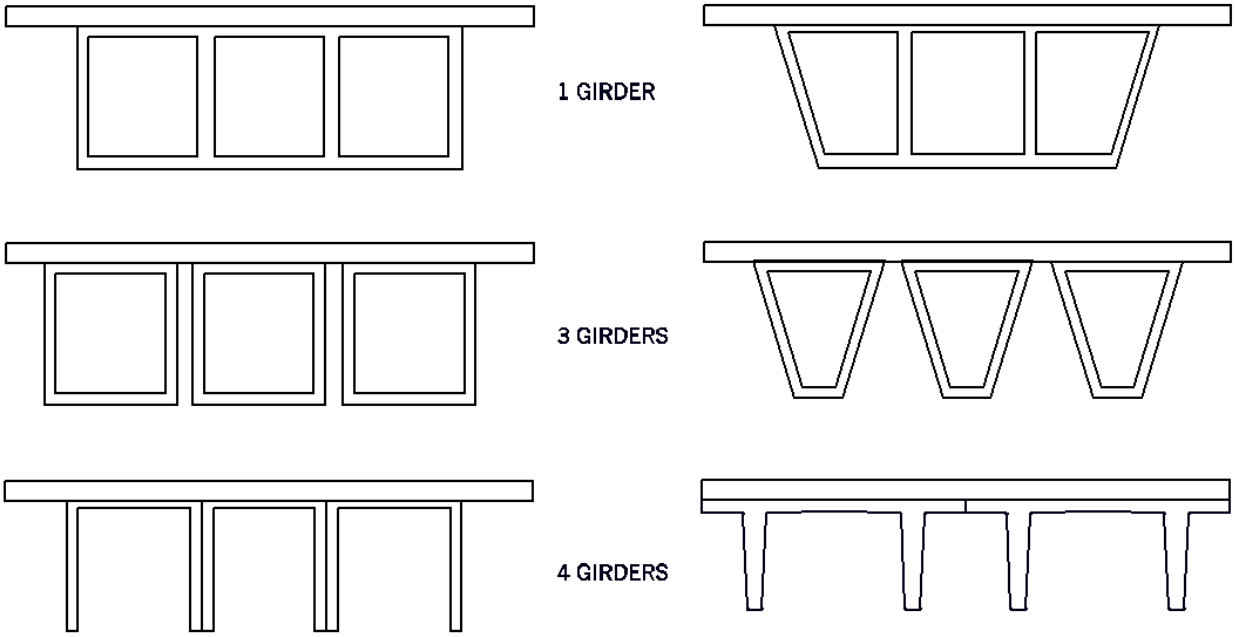
890–Steel SIP Form

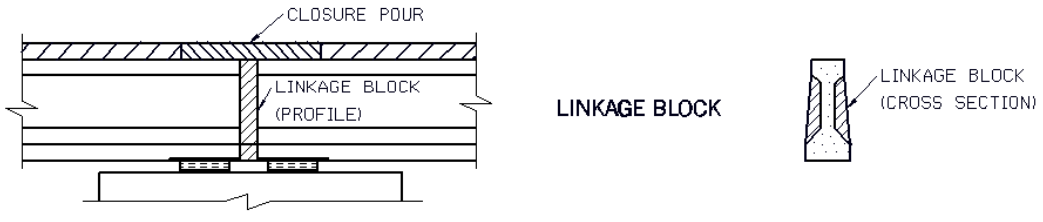
891-P/S Conc. SIP Form

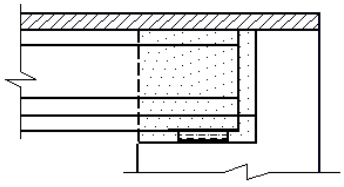
APPENDIX B
BRIDGE ELEMENT EXAMPLES

Superstructure Elements

GIRDERS







APPENDIX B
BRIDGE ELEMENT EXAMPLES

Superstructure Elements

102 – Steel Closed Box Girder

104 – P/S Closed Box Girder

105 – Reinf. Conc. Closed Box Girder

107 – Steel Open Girder

109 – P/S Conc. Open Girder

110 – Reinf. Conc. Open Girder

111 – Timber Open Girder

113 – Steel Stringer

116 – Reinf. Conc. Stringer

117 – Timber Stringer

120 – Steel Truss (Pony)

141 – Steel Arch
(Off System only-not many in OK)

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Superstructure Elements

144 – Reinf. Conc. Arch

145 – Masonry Arch

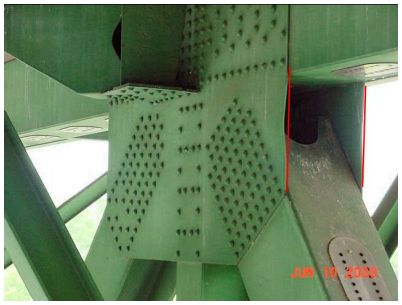
152 – Steel Floor Beam

None In
Oklahoma

154 – P/S Conc. Floor Beam

155 – Reinf. Conc. Floor Beam

161 – Steel Pin&Hanger Assy



162 – Steel Gusset Plate

814 – Steel Girder-Conc. Encased

819 – P/S Conc. 5Ft. Beam End

821 – Steel Truss (Overhead)

822 – Steel Truss (Deck)

863 – Steel Pier Beam

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Superstructure Elements

864–Post Tensioned Conc. Pier Bm.

865–Steel 5 Ft. Beam End

872–Steel Girder Under Const. Jt..

873-P/S Conc. Girder Under Const. Jt.

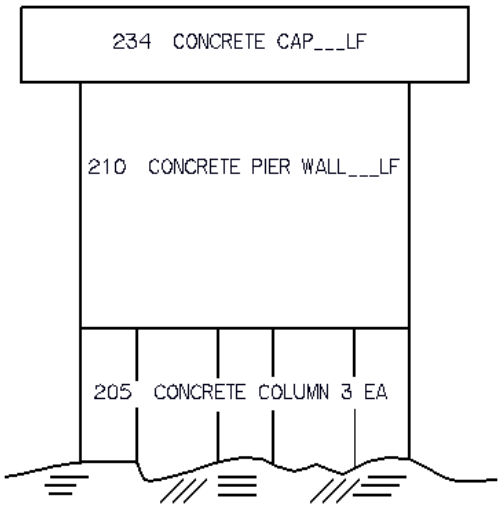
877-Steel 5 Ft. Stringer End

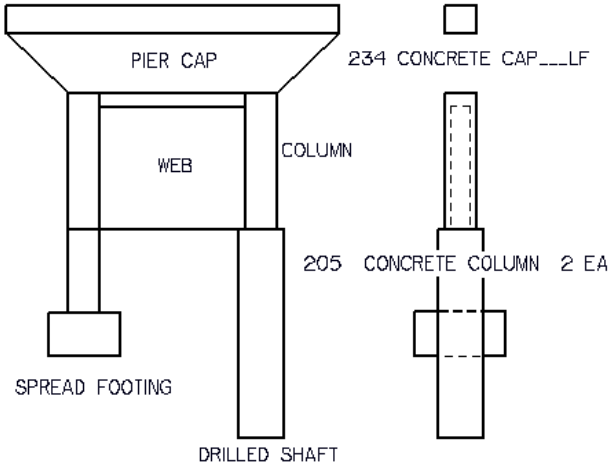
879-Steel Stringer under Const. Jt.

APPENDIX B
BRIDGE ELEMENT EXAMPLES

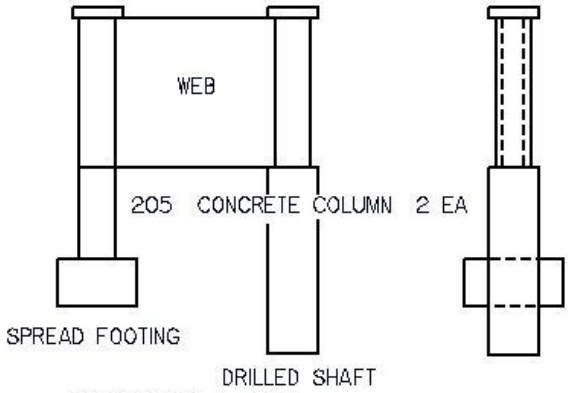
Substructure Elements

PIERS

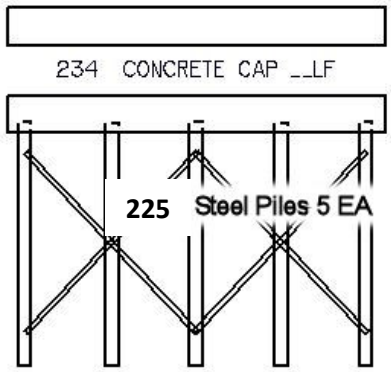




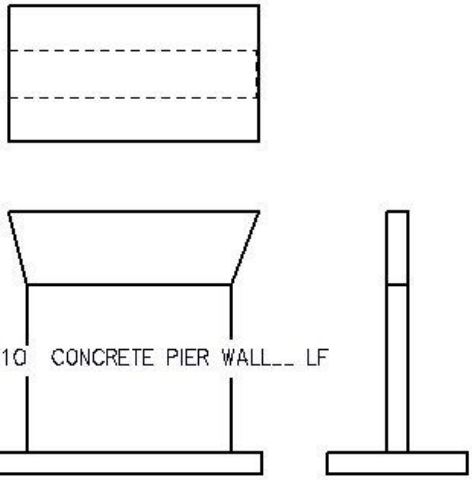
CANTILEVER PIER

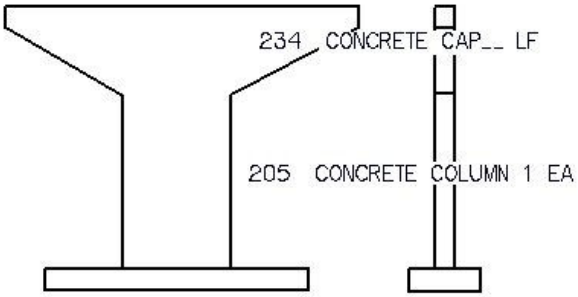


DUMB-BELL PIER



PILE BENT

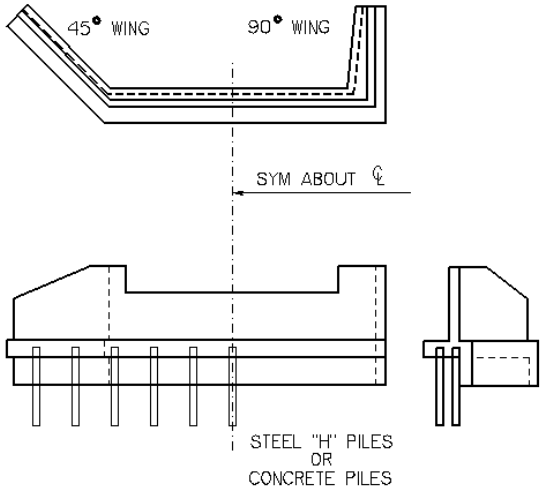




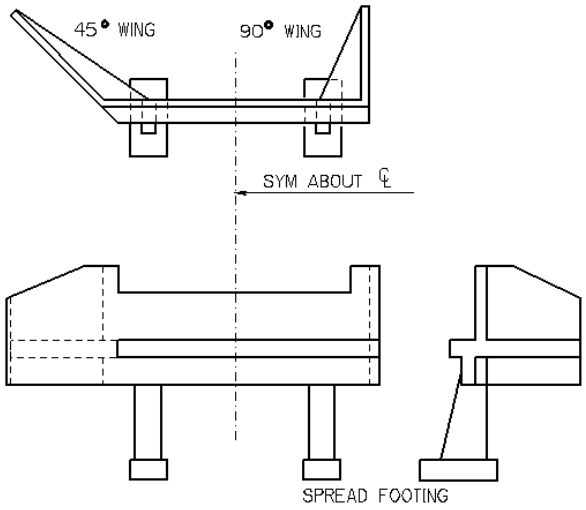
APPENDIX B
BRIDGE ELEMENT EXAMPLES

Substructure Elements

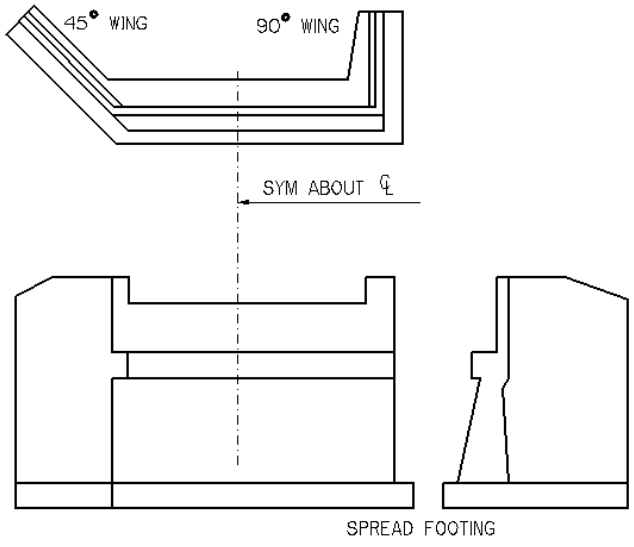
TYPICAL ABUTMENTS



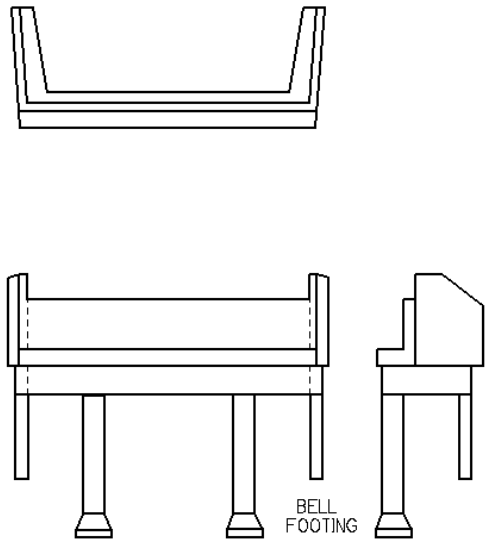
SKELETON ABUTMENT



PEDESTAL ABUTMENT



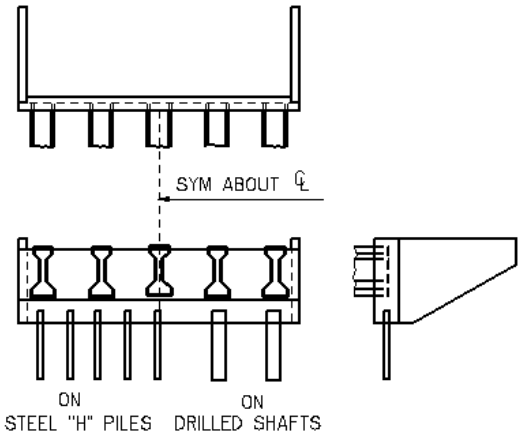
CANTILEVER ABUTMENT



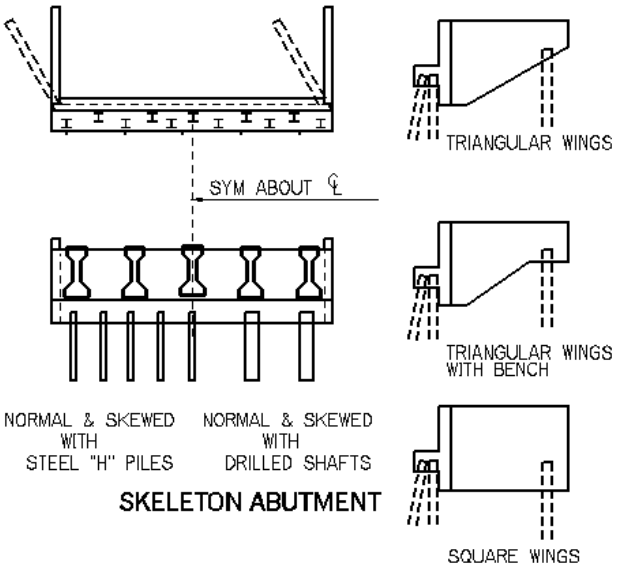
DRILLED SHAFT ABUTMENT

APPENDIX B
BRIDGE ELEMENT EXAMPLES

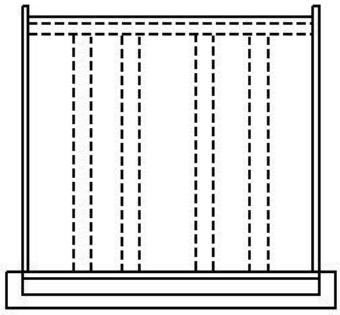
TYPICAL ABUTMENTS

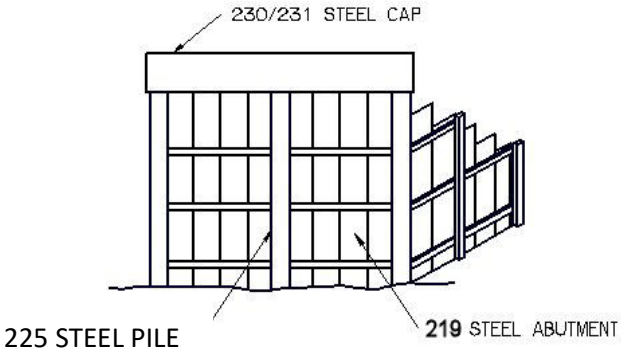


INTEGRAL ABUTMENT

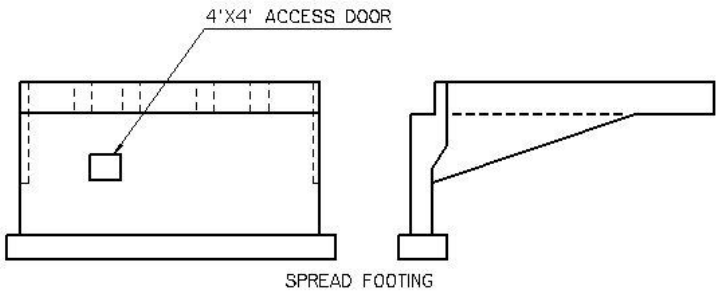


SKELETON ABUTMENT

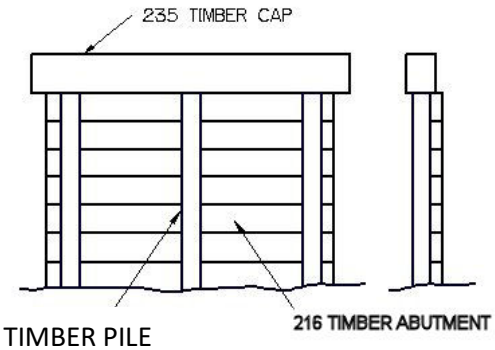




STEEL PILE ABUTMENT



MODULAR ABUTMENT



TIMBER ABUTMENT

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Substructure Elements

202 – Steel Column

204 - P/S Conc. Column

205 – Reinf. Conc. Column

206 – Timber Column

207 – Steel Tower

210 – Reinf. Conc. Pier Wall

211- - Other Mat'l Pier wall

212 – Timber Pier Wall

213 – Masonry Pier Wall

215 – Reinf. Conc. Abutment

216 Timber Abutment

217 – Masonry Abutment

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Substructure Elements

218 – Other Material Abutment

219 – Steel Abutment

220 – Reinf. Conc. Pile Cap/Ftg.

225 – Steel Pile

227 – Reinf. Conc. Pile

228 – Timber Pile

231 – Steel Pier Cap

233 – P/S Conc. Pier Cap

234 – Reinf. Conc. Pier Cap

235 – Timber Pier Cap

818 – Integral Abutment

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Culverts

240 – Steel Culvert

241 – Reinf. Conc. Culvert

None In Oklahoma

242 – Timber Culvert

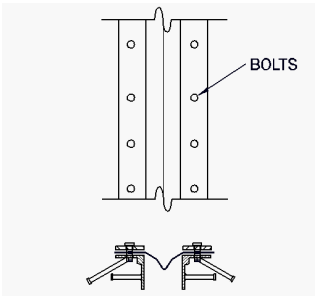
None In Oklahoma

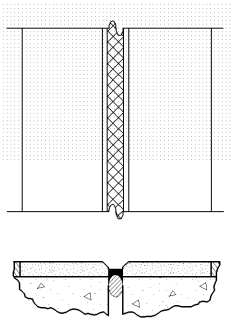
243 – Other Material Culvert

244 - Masonry Culvert

APPENDIX B
BRIDGE ELEMENT EXAMPLES

STANDARD EXPANSION JOINTS (BRIDGE)

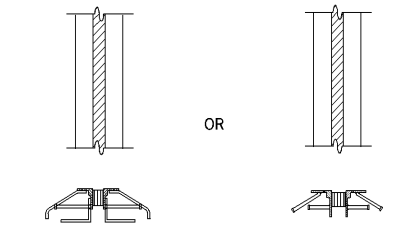


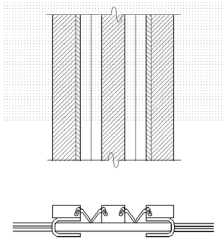


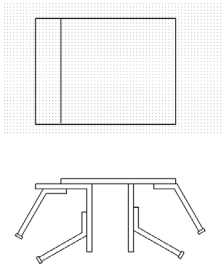
300 STRIP SEAL (EXP 1)

301 POURABLE EXPANSION JOINT (TYPICAL)

ELEMENT 301 IS USED AS A REHAB FOR FAILED JOINT ELEMENTS 300, 302 AND 304. ARMORING MAY OR MAY NOT BE PRESENT DEPENDING ON WHETHER THE ORIGINAL JOINT WAS ARMORED.







302 - ARMORED JOINT
(ISAJ-17 / PSAJ-16)

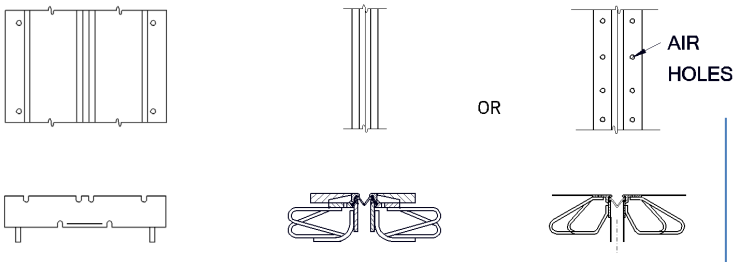
303 - ASSEMBLY JOINT
(2 SEAL MODULAR)

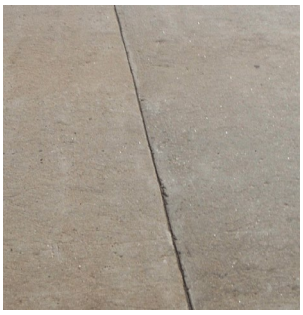
304 - OPEN EXPANSION JOINT
(SLIDING PLATE, ETC.)

302 – COMPRESSION JOINT
(EXP-1)

APPENDIX B
BRIDGE ELEMENT EXAMPLES

STANDARD EXPANSION JOINTS (BRIDGE)

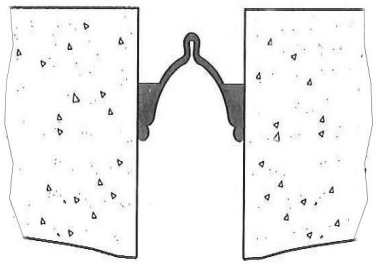




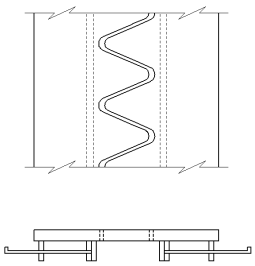
909 – POURABLE FIXED JOINT SEAL OR OPEN JOINT WITH NO DEVICE

* 905 - STEEL REINFORCED JOINT (WABOFLEX, ETC.)

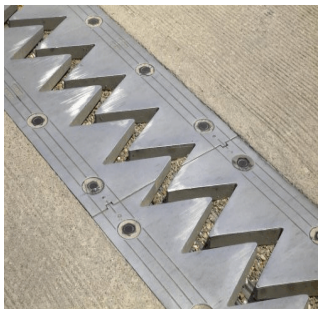
906 - SEALED EXPANSION JOINT (SEJ-3)



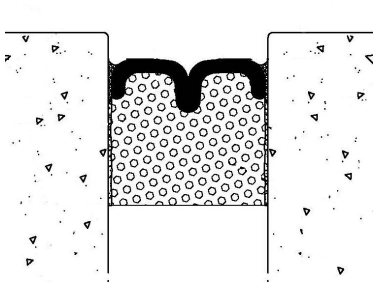
910 – PREFORMED SILICONE JOINT*



907 - STEEL FINGER * JOINT (SED-2)



908 - ALUMINUM FINGER JOINT (CIPEC)

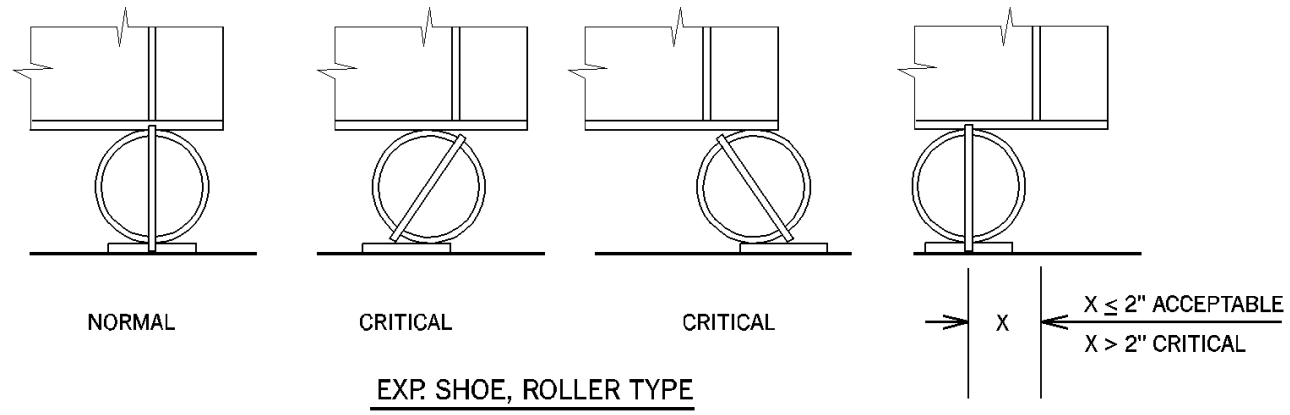


911 - PREFORMED SILICONE COMPRESSION JOINT *

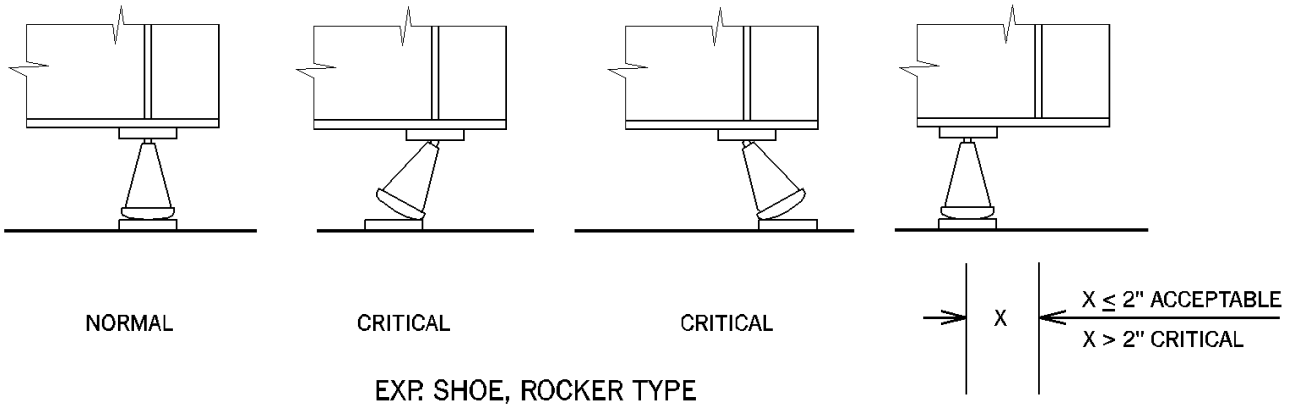
* VERY FEW OF THESE JOINT ELEMENTS ARE USED IN OKLAHOMA.

APPENDIX B
BRIDGE ELEMENT EXAMPLES

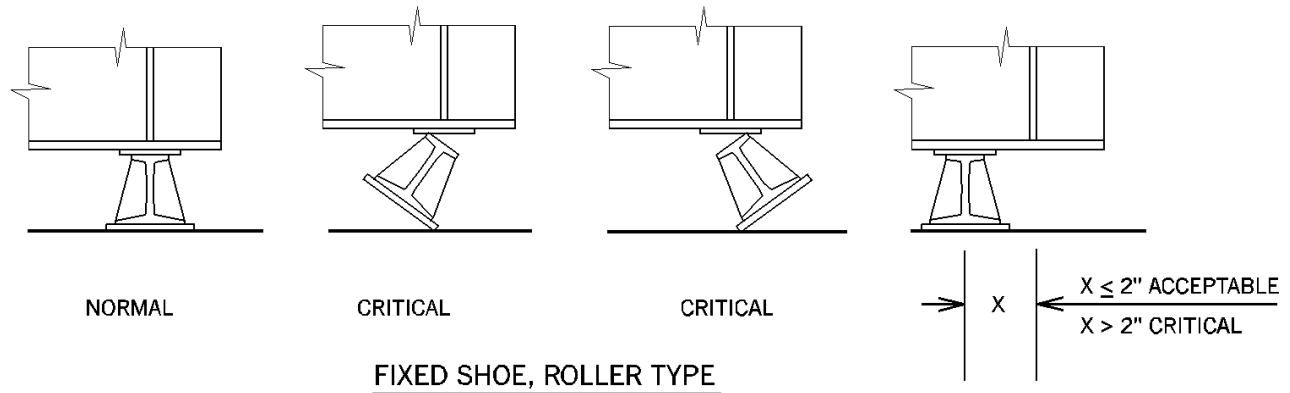
BEARINGS



EXP. SHOE, ROLLER TYPE



EXP. SHOE, ROCKER TYPE



FIXED SHOE, ROLLER TYPE

Associated Bearing Elements

311 Movable Bearing
313 Fixed Bearing

APPENDIX B
BRIDGE ELEMENT EXAMPLES

Bearings

313 – Fixed Bearing
311 – Movable Bearing

916 – Steel Bearing Assy.
310 – Elastomeric Bearing Pad

314 – Pot Bearing

Approach Slabs

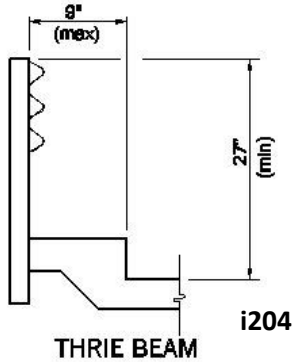
321 – Reinf. Conc. Approach Slab

APPENDIX B
BRIDGE ELEMENT EXAMPLES

STANDARD TRAFFIC RAILS (BRIDGE)

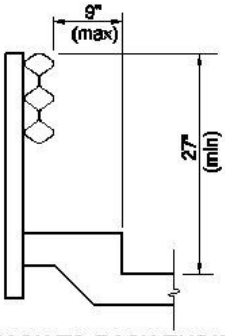
CURRENTLY ACCEPTABLE FOR NBIS 36

CODE ITEM 36 = 1



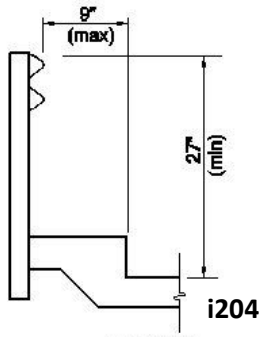
i204 = 01

THRIE BEAM
(MAX. POST SPACING 3'-0")
330 METAL RAILING



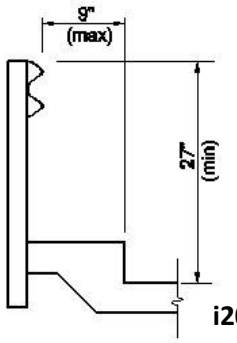
i204 = 02

BACK-TO-BACK THRIE BEAM
(MAX. POST SPACING 10'-3")
330 METAL RAILING



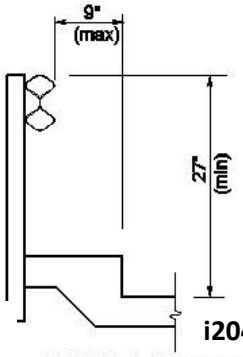
i204 = 03

W-BEAM
(MAX. POST SPACING 1'-10")
330 METAL RAILING



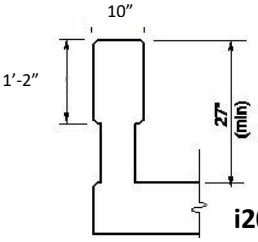
i204 = 04

DOUBLE W-BEAM
(MAX. POST SPACING 3'-9")
330 METAL RAILING



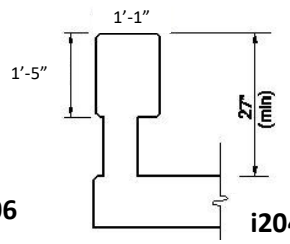
i204 = 05

BACK-TO-BACK W-BEAM
(MAX. POST SPACING 6'-11")
330 METAL RAILING



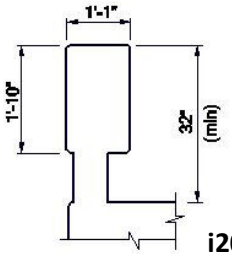
i204 = 06

TR-1
331 CONCRETE RAILING
OFF SYSTEM CODE ITEM 36=1
ON SYSTEM CODE ITEM 36=0



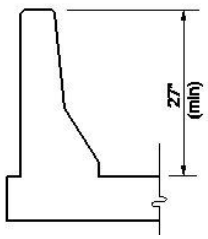
i204 = 07

TR-3
331 CONCRETE RAILING

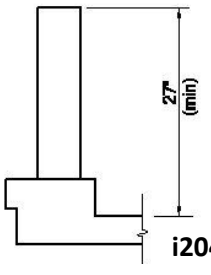


i204 = 08

TR-4
331 CONCRETE RAILING



SFP-1
331 CONCRETE RAILING



i204 = 10

PARAPET RETROFIT
331 CONCRETE RAILING

332 TIMBER RAILING
i204 = 22

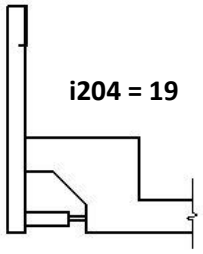
Use SFP-1 for 34" tall
i204=09
Use F-Shaped Parapet for 42" tall : **i204=21**

APPENDIX B
BRIDGE ELEMENT EXAMPLES

STANDARD TRAFFIC RAILS
(BRIDGE)

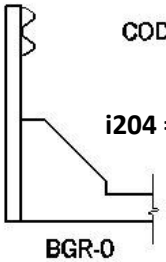
OBSOLETE-NO LONGER
ACCEPTABLE FOR NBIS 36

CODE ITEM 36 = 0



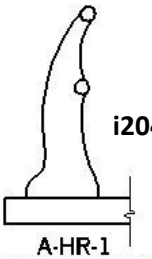
i204 = 19

330 METAL RAILING



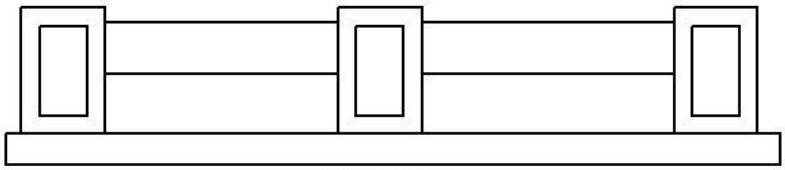
i204 = 18

BGR-0
330 METAL RAILING



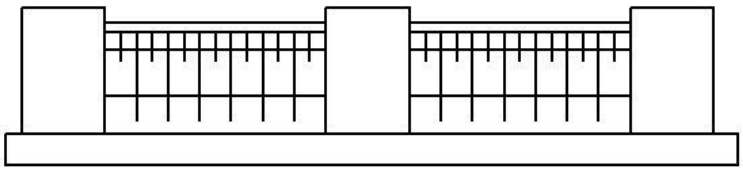
i204 = 17

A-HR-1
330 METAL RAILING



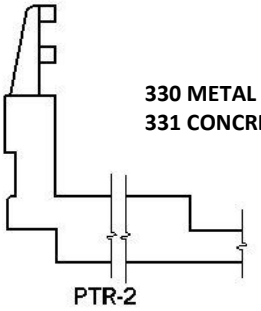
i204 = 16

BC-HANDRAIL
331 CONCRETE RAILING



i204 = 15

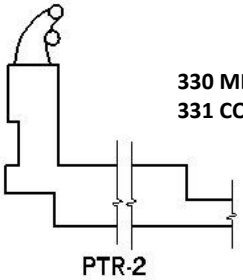
HR-3
330 METAL RAILING AND 331 CONCRETE RAILING



330 METAL RAILING
331 CONCRETE RAILING

i204 = 14

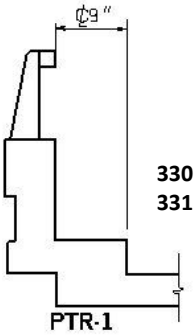
PTR-2



330 METAL RAILING
331 CONCRETE RAILING

i204 = 13

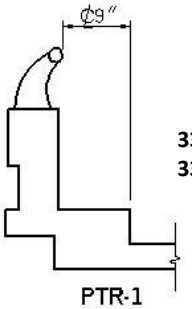
PTR-2



330 METAL RAILING
331 CONCRETE RAILING

i204 = 12

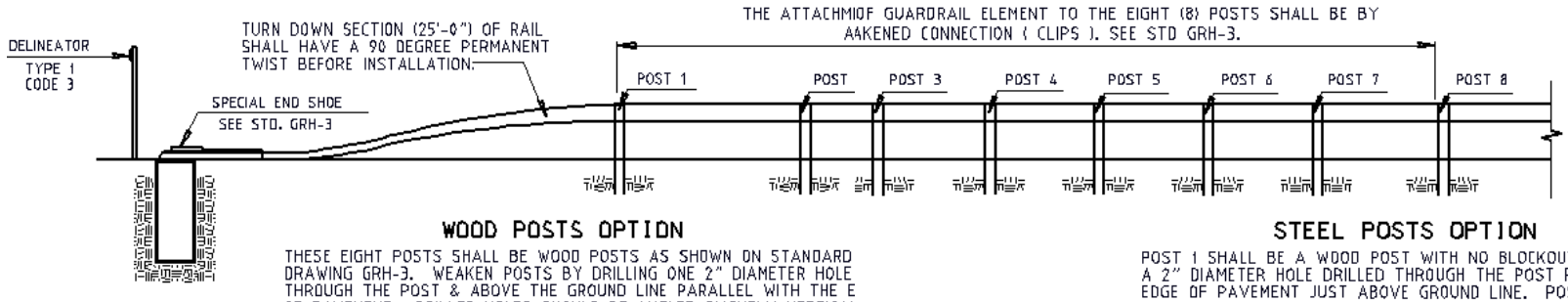
PTR-1



330 METAL RAILING
331 CONCRETE RAILING

i204 = 11

PTR-1



WOOD POSTS OPTION

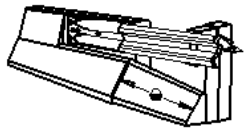
THESE EIGHT POSTS SHALL BE WOOD POSTS AS SHOWN ON STANDARD DRAWING GRH-3. WEAKEN POSTS BY DRILLING ONE 2" DIAMETER HOLE THROUGH THE POST & ABOVE THE GROUND LINE PARALLEL WITH THE E OF PAVEMENT. DRILLED HOLES SHOULD BE ANGLED SLIGHTLY VERTICAL PREVENT WATER FROM STANDING. HOLES SHALL BE TREATED WITH AN APPROVED PRESERVATIVE. BLOCKOUT SHALL NOT BE USED AT POST 1.

STEEL POSTS OPTION

POST 1 SHALL BE A WOOD POST WITH NO BLOCKOUT AND WITH A 2" DIAMETER HOLE DRILLED THROUGH THE POST PARALLEL TO EDGE OF PAVEMENT JUST ABOVE GROUND LINE. POST 2 THRU 8 SHALL BE STEEL POSTS WITH BLOCKOUTS. SEE STANDARD DRAWING GRH-3 FOR POST DETAILS.

CHOR UNIT - TYPE A

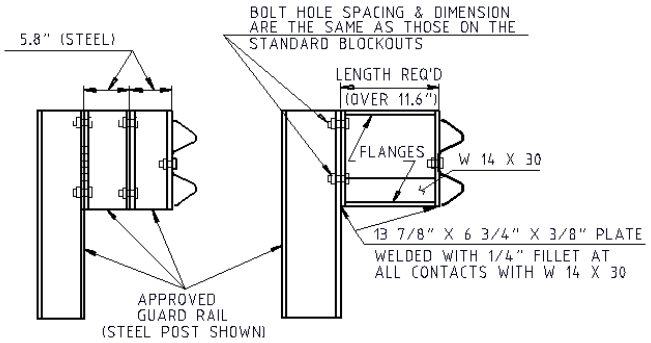
NHS APPROACH = 0, TRAILING = 1
NON-NHS (APPR. or TRAIL.) = 1



DUAL RAILS
(W-BEAMS)

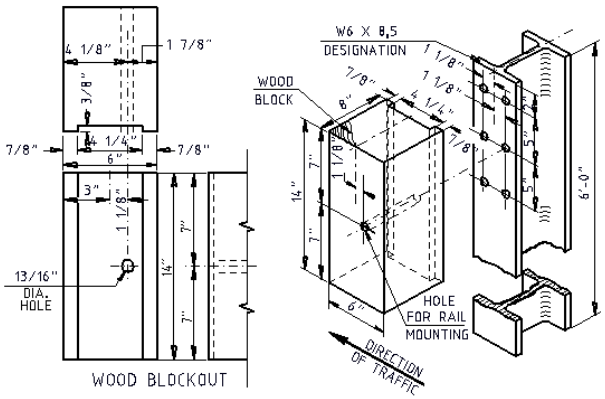
ANCHOR UNIT TYPE D(BF)
SLOPED FACE PARAPET (NOTCHED)

NHS (WITH CURB) = 1
NHS (WITHOUT CURB) = 0
NON-NHS (WITH OR WITHOUT CURB) = 1



STEEL POST AND STEEL BLOCKOUT

NHS (STEEL) = 0
NON-NHS (STEEL) = 1



STEEL POST AND WOOD OR PLASTIC BLOCKOUT

NHS (WOOD OR PLASTIC) = 1
NON-NHS (STEEL) = 1

APPENDIX B
BRIDGE ELEMENT EXAMPLES

NESTED GUARD RAILS
NEAR ABUTMENT
NHS = 1/ NON-NHS = 1

GUARD RAIL WITH STEEL POST
AND BLOCKOUTS
NHS = 0 / NON-NHS = 1

GUARD RAIL TRANSITION
NHS = 1/ NON-NHS = 1

GUARD RAIL TRANSITION
NHS = 0 / NON-NHS = 0

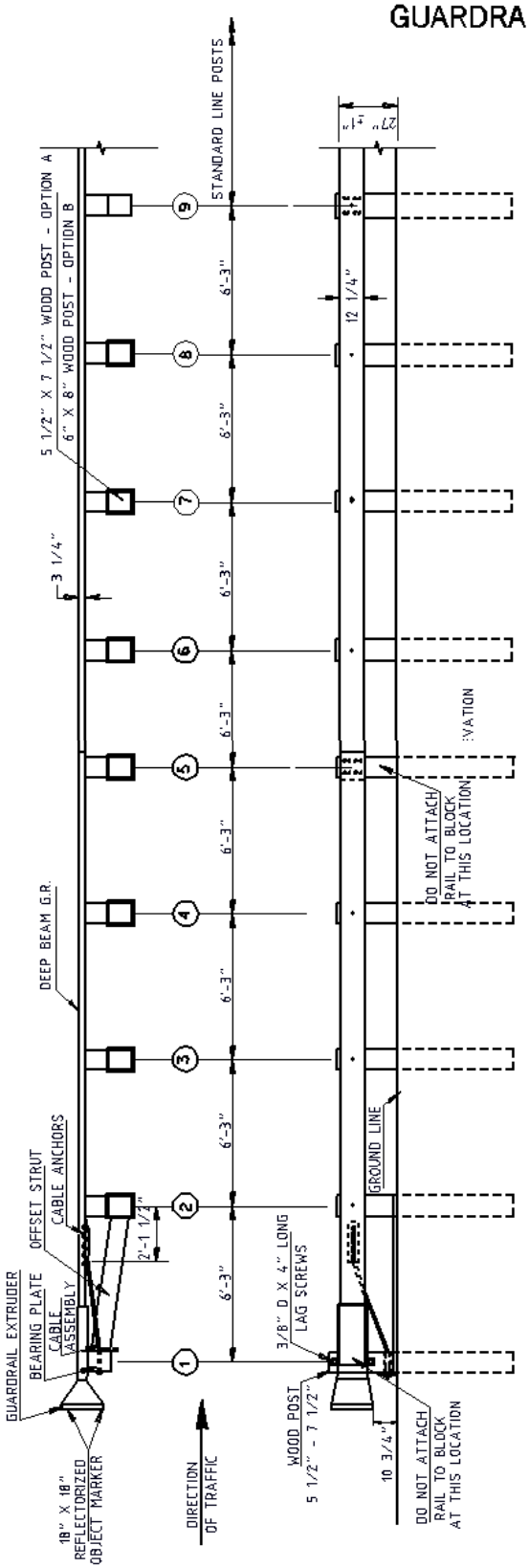
TRAFFIC RAIL TRANSITION
NHS = 0/ NON-NHS = 1

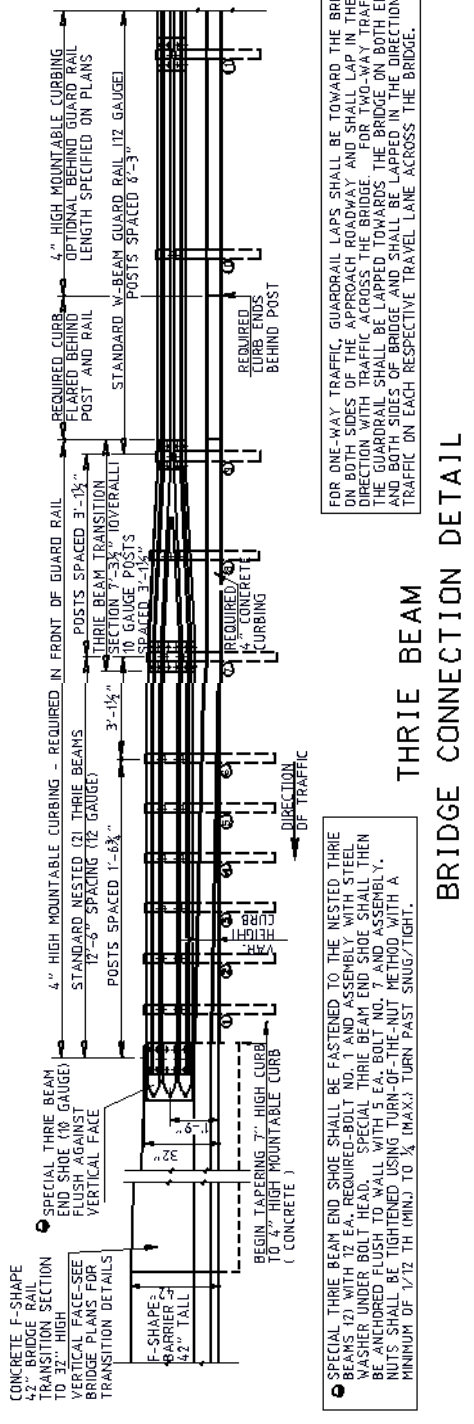
GUARD RAIL EXTRUDER
NHS = 1/ NON-NHS = 1

TURN DOWN GUARD RAIL
TERMINATOR
NHS APPR. = 0, TRAIL.= 1
NON-NHS (APPR. OR TRAIL.) = 1

GUARD RAIL TERMINATOR
NHS = 0 / NON-NHS = 0

GUARDRAILS AND ENDS





APPENDIX B
BRIDGE ELEMENT EXAMPLES

Bridge Railing

330 – Metal Railing

331 – Reinf. Conc. Bridge Railing

332 – Timber Bridge Railing

333 – Other Material Bridge Railing

334 – Masonry Bridge Railing

APPENDIX B
BRIDGE ELEMENT EXAMPLES

510 – Wearing Surface

515 – Steel Superstructure Protective Coating

841 – Precast Concrete Arch Culvert

870 – Concrete Wingwall

871 – Steel Wingwall

912 – Culvert Construction Joint

918 – Steel Substructure Protective Coating

919 – Steel Railing Protective Coating

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

The following is a summary of O.D.O.T. Guidelines which provide additional direction for certain federal items from the FHWA Coding Guide for use in Oklahoma.

Item 5 Multiple Routes

1. When multiple routes exist on the structure, the highest class of route will be the route for which data is recorded. The hierarchy is in the order listed for Item 5b-Route Signing Prefix. Code only one record with item 5a = '1-Route On' per structure. All NBI data items will be coded.

2. When multiple routes on separate roadways pass under a structure, and these routes are on the federal-aid system, are defense routes or are otherwise important, then a separate underpass record is required for each route. Item 5a will be coded as 'A-1st Route Under', 'B-2nd Route Under', 'C-3rd Route', etc. NBI data items will be coded for each route, where applicable. At intersections where the routes are aligned vertically, the uppermost of the under routes will be coded as route 'A', the next route will be coded as route 'B', etc. The ground level route will receive the highest alphabetical letter. At intersections where the under routes are aligned horizontally, review the interchange as a whole to determine the relative elevation of each under route. Consider nearby interchanges, if necessary.

3. When multiple routes on a single roadway pass under a structure, and these routes are on the federal-aid system, are defense routes or are otherwise important, then a single underpass record is coded. Item 5a will be coded as '2-One Route Under''. NBI data items will be recorded for the route with the highest classification, where applicable.

4. When multiple routes exist, both over and under a structure, the primary of all routes is used to determine the structure number for that location. The hierarchy of item 5b is used to determine the primary route, with the following addition: bridges on the turnpike system (with the exception of the Bailey/Norman Spur) will be treated as category '1a' (they will still be entered into BrM as '1' or '8', as appropriate). Turnpike routes will be chosen as the primary route over all other routes, except interstates. NHS routes have priority over non-NHS routes and all turnpikes are NHS routes except for the Bailey/Norman Spur.

Items 8 & 33 Bridge Medians

Item 8 requires that a structure with a closed median be considered as one structure. Item 33 defines a closed median as a situation where the median is bridged over and is capable of supporting traffic (mountable). A curb height of greater than 9" is considered non-mountable. Therefore, curbs less than or equal to 9" would be considered mountable. The phrases 'capable of supporting traffic' and 'designed to accommodate traffic' appear to be the same, i.e., both will carry traffic.

Item 9 Location

For On-System bridges, the location should be given relative to the nearest junction of two major highways, with preference to the junction which begins the control section.
For Off-System bridges, the location should be given relative to the nearest town center, highway junction or major city street intersection, as appropriate.

Item 10 Inventory Route, Minimum Vertical Clearance

Code item 10 the same as item 53 for the route on the structure and code item 10 the same as item 54b for the route under the structure. Use the minimum single point measured clearance and not the maximum clearance for a 10 ft. wide load. Code the permanent measured clearance, not a temporary clearance due to construction falsework or scaffolding. See Appendix G for vertical clearance signage requirements when vertical clearance is less than 15 ft.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Items 21 and 22 Maintenance Responsibility and Owner

All bridges with State or U.S. highways over a turnpike will be entered in BrM with the State (code '01') having ownership and maintenance responsibilities and there will be no 'T' in the in the middle of the structure name. The Turnpike Authority ('31') will be listed as owner and maintenance for turnpike bridges over State or U.S. highways and all other bridges along every turnpike and there will be a "T" in the middle of the structure name. Refer to Appendix DD for additional information.

Item 26 Functional Classification of Inventory Route

When coding interstate bridge ramps, the ramp should have the same functional classification as the higher highway facility they serve. This same rule applies to all ramps associated with grade separated interchanges regardless of functional classification, including the NHS.

Example
Interstate to Collector Off Ramp - Ramp is Interstate
Collector to Interstate On Ramp - Ramp is Interstate
Principal Arterial to Collector Off Ramp - Ramp is Principal Arterial
Collector to Principal Arterial On Ramp - Ramp is Principal Arterial

Item 31 Design Load

On February 2, 2011, the FHWA issued a memo revising the design load codes. The following codes will replace the codes specified in the FHWA Coding Guide. Note that there are two distinct codes for 'Other' and 'Unknown'. Use code '0' where the design load is unknown due to the absence of plans, design calculations or other information. Use code 'C' for situations which increase the design load but are not based on AASHTO design trucks.

Code	Description
1	H10
2	H15
3	HS15
4	H20
5	HS20
6	HS20+Mod
7	Pedestrian
8	Railroad
9	HS25 or Greater
0	Unknown
A	HL93
B	>HL93
C	Other

Item 32 Approach Roadway Width

Normal width of usable approach roadway measured just beyond the end of the approach guardrail. Turf shoulders are not considered when measuring approach roadway width. Do not include off ramps in the width measurements.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Item 36 Traffic Safety Features (Culvert)

What is the proper coding of item 36 under the following conditions?

1. Box culvert under deep fill with no guardrail present
If the same roadway cross section is carried across the culvert as on the roadway, and if acceptable standards do not require a guardrail on the roadway section, then no guardrail is required over the culvert. Code item 36 'NNNN' (safety feature not required.)

However, if the same roadway section is not carried across the culvert (for example, the slope is significantly steepened) or acceptable standards require a guardrail, then the site safety features condition is unacceptable. Code item 36 '0000' (safety feature is required and none is provided.)

2. Box culvert under deep fill having guardrail with buried ends
If all features of the installed guardrail (bridge railing, transitions, approach guardrail, approach guardrail ends) are required and/or meet acceptable standards, then code item 36 as '1111'.

3. Box culvert carrying traffic directly on its top slab (without guardrail)
In most instances a guardrail would be required. Code item 36 '0000' (safety feature is required and none is provided.) An appropriate bridge rail element must also be coded.

4. Box culvert carrying traffic directly on its top slab (with guardrail)
If all features of the installed guardrail (bridge railing, transitions, approach guardrail, approach guardrail ends) meet acceptable standards, then code item 36 as '1111'. An appropriate bridge rail element must also be coded.

5. For span bridges, do not code 'N', code '0' or '1' only. For culverts, the first 2 positions of item 36 are coded '0' or '1' only when there is a bridge rail element. Otherwise they are coded 'N'.

Item 41 Structure Open, Posted or Closed to Traffic

If tree limbs are covering the signs, create an appropriate repair recommendation and describe in Notes with sufficient detail to identify the problem. Do not change a 'P' coding to 'B'. Refer to item 103 for additional instructions in the case of a temporary bridge.

If one or both posting signs are missing from a bridge requiring posting then the bridge must be coded 'B'. However, the inspector must inform the bridge owner of the condition and follow-up to confirm that signs are placed and that the BrM database is updated to show the bridge is correctly posted. Refer to Appendix I for the appropriate timeline.

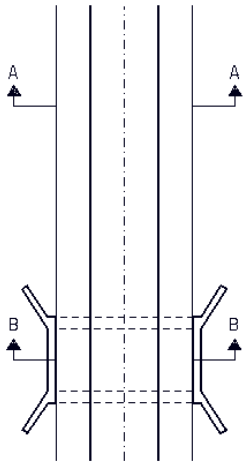
When item 41 is set to 'E' for a temporary structure, be sure to describe in the Structure Description field under the Inventory tab/Structure Units side tab, the original structure plus the temporary structure. Additionally, set all element condition states to their worst condition state as well as NBIs Items 58, 59, 60 & 62 to "0", as applicable. Also, NBIS Item 70 should be set to '5'.

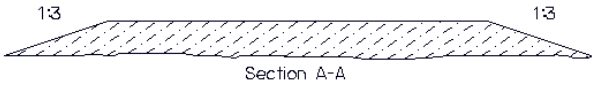
All bridges with a load posting sign are to be coded as 'P', regardless of whether the sign is required or not. Do not use 'R' for a weight posted bridge.

Item 47 Total Horizontal Clearance
Code the permanent measured clearance, not a temporary clearance due to construction barriers.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

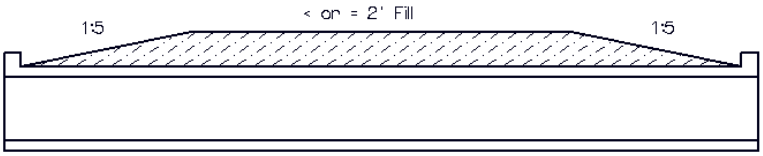
ITEM 51





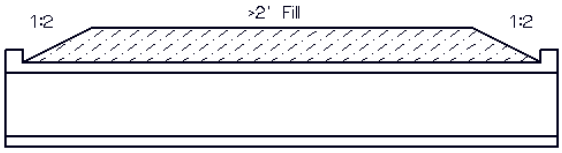
Section A-A

Approach Roadway
Cross-Section



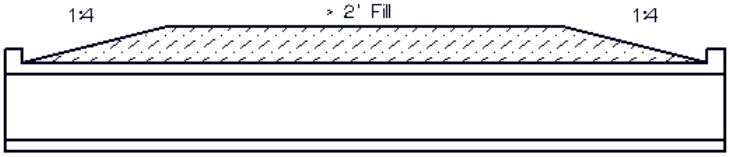
Section B-B

For two ft. or less of fill on culvert, treat as 'finish grade' and code the actual roadway width.



Section B-B

For greater than 2 Ft. of fill on culvert, if the side slopes of fill across the culvert, are steeper than the approach cross section, code the actual roadway width.

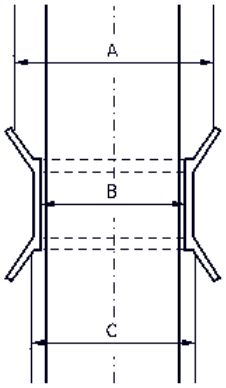


Section B-B

For greater than 2 Ft. of fill on culvert, if the side slopes of fill across the culvert, are flatter than the approach cross section, code '0000'.

Note: For any culvert where item 62 is less than '5' (moderate to major deterioration), code the actual roadway width (curb - to - curb). This will help make deteriorated culverts eligible for replacement funds

ITEM 32



For item 32, when there is a variation between the approaches at either end of the structure, the most restrictive measurement is the larger approach, relative to the structure. For example, in the illustration approaches 'A' and 'C' are both larger than the structure 'B'. Since approach 'A' is larger than approach 'C', the measurement for approach 'A' is recorded in item 32 as the most restrictive.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Items 28, 51, and 102 Lanes On the Structure, Bridge Roadway Width and Direction of Traffic

ITEM 51	Assigned number of lanes	ITEM 28 - must be coded ...	TRAFFIC LANES	ITEM 102 must be coded ....
less than 16' - 00"	1	1	1-way	1 = 1-way traffic
			2-way	3 = 1-lane for 2-way
greater than or equal 16' - 00"	> or = 2	> or = 2	2-way	2 = 2-way traffic
			Divided highway or ramp	1 = 1-way traffic

Item 53 Minimum Vertical Clearance over Bridge Roadway

Item 53 is to be coded in feet and tenths of feet (e.g., 15' 6" is coded as 15.5 ft.).

Items 53 and 54 Minimum Vertical Clearance over Bridge Roadway and Minimum Vertical Underclearance

Question: Why the inconsistency in where the clearance measurement is taken between Item 53 - Minimum Vertical Clearance over Bridge Roadway and Item 54 - Minimum Vertical Underclearance?
Answer: The bridge deck can be re-stripped from time to time to include the shoulders and usable lanes, therefore, a greater potential for damage from over-height vehicles would exist.

Item 54 Minimum Vertical Underclearance

Item 54 is to be coded in feet and tenths of feet (e.g., 15' 6" is coded as 15.5 ft.).

The minimum roadway clearance for Item 54 - Minimum Vertical Underclearance is to be measured from the travel lanes.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Items 58, 59, 60 and 62 NBI Ratings

Items 58, 59, 60 and 62 are NBI Ratings (0-9), where 9 is Excellent. Oklahoma performs dual inspections. Perform the element inspection first, then the NBI rating. **Do NOT run the Translator in BrM.**

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

Code	Description
N	**Not Applicable**
9	**Excellent Condition**
8	**Very Good Condition –** no problems noted.
7	**Good Condition** – some minor problems.
6	**Satisfactory Condition** – structural elements show some minor deterioration.
5	**Fair Condition** – all primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
4	**Poor Condition** – advanced section loss, deterioration, spalling or scour.
3	**Serious Condition** – loss of section, deterioration, spalling or scour have seriously affected primary structure components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	**Critical Condition** – advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	**"Imminent" Failure Condition** – major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	**Failed Condition** – out of service. Beyond corrective action.

Condition codes are properly used when they provide an overall characterization of the general condition of the entire component being rated. Conversely, they are improperly used if they attempt to describe localized or nominally occurring instances of deterioration or disrepair.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Item 58 Deck

In arriving at the condition rating for the deck, the condition of the deck of the worst span may dictate the deck rating. The condition of the wearing surface (seal, mat, latex mortar, low slump overlay) will not influence the deck rating. Comprehensive rehabilitation of the deck will normally restore the deck to a rating of 7 or possibly an 8.

When the deck is on one of the integral type bridges, the deck will influence the superstructure rating. However the superstructure will not influence the deck rating. Non-integral deck types and their condition will not influence the superstructure rating.

A defective expansion device alone should not cause a rating below ‘6'.

To determine the condition rating of a deck with stay in place forms, top side inspection techniques such as sounding, chloride sampling, coring, etc. will work. The assessment of whether honeycombed areas exist is not possible with stay in place form construction, but we believe the top side evaluation will suffice for the purposes of Item 58 - Deck. In any case, the inspection must be sufficient to satisfy requirements and leave no doubt that the slab will support traffic.

Decks of T-beams or girder bridges under fill must be rated according to the condition of the soffit.

Item 59 Superstructure

In arriving at the condition for the superstructure, the condition of the worst span may dictate the superstructure rating. The condition of the paint system on steel structures will not influence this rating unless corrosion is advanced resulting in a loss of section of a structural support element. The condition of the nonstructural support elements will not influence this rating. For integral type bridges only, the condition of the deck will influence the superstructure rating. Comprehensive rehabilitation of the superstructure will normally restore the superstructure to a rating of ‘8'.

Item 60 Substructure

In arriving at the condition for the substructure, the condition of the worst substructure unit may dictate the substructure rating. In general, the substructure rating is an average rating based on all substructure units. The superstructure element of structures where the superstructure is integral with the substructure will not influence the substructure rating. Comprehensive rehabilitation of substructure units will normally restore the substructure unit to a rating of ‘7' or possible ‘8'.

The FHWA has revised the language of Item 60 - Substructure to read as follows:

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

All substructure elements should be inspected for visible signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage, and corrosion. In all cases, the NBI rating for Item 60 cannot be more than the rating for item 113. This will ensure the scour condition is factored into the bridge sufficiency rating which considers item 60 but not item 113.

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.”

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Item 61 Channel and Channel Protection

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

Record any signs of channel instability and the location in the inspection notes. Compare with previous inspections and any available cross section plots. These notes are vital to scour assessments and evaluations. There are no real measurable limits to the observed area. If you observe anything that could eventually affect the stability of the bridge, record it here.

Rate and code the condition in accordance with the following descriptive codes:

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

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Use these additional terms and descriptions to assist in your notes and rating of the channel. ***Always use engineering judgment when undecided.*** Think about painting the big picture and what information you are trying to convey to bridge owner.

DEFECT	MINOR	MODERATE	MAJOR
Alignment Channel approach has ***changed*** from original plans	Flow angle of attack 15-30 degrees with respect to bridge substructure	Flow angle of attack 30-45 degrees with respect to bridge substructure.	Flow angle of attack 45 degrees or more with respect to bridge structure.
Migration Lateral movement of the channel across its floodplain from original plans	Thalweg has moved from its baseline location. The current location doesn't threaten the bridge or approach roadway.	Thalweg continues to move and now threatens the bridge or approach roadway.	Approach roadway shoulders and /or abutment fill have begun to wash out.
Degradation Channel or Thalweg lowering. Removal of sediment by flow in channel *in area of bridge*	Exists within tolerable limits, bridge is long enough.	Substructure elements threatened by degradation and exposure.	Degradation has exposed substructure units to the extent that the stability of bridge is in danger.
Aggradation Channel or Thalweg build up or accumulations. Deposition of sediment in channel *in area of bridge*	Exists within tolerable limits	Hydraulic opening is reduced *and* affecting the performance of the bridge.	Hydraulic opening is more than 90% blocked
Debris	Restricts channel slightly, may be prone to build up	Large piles exist and restrict channel *and/or* bridge capacity.	Debris build up is blocking the channel and bridge capacity.
Bank Erosion Wearing away of the banks of a stream or river	Erosion or instability or exposed bank soils that DOES NOT threaten the bridge or approach roadway	Erosion or instability or exposed bank soils that has begun to threaten the bridge or approach roadway	Approach roadway shoulders and /or abutment fill have begun to wash out.
Slumping A form of mass wasting. Movement characterized by sliding along the surface	Small areas of exposed soils exist but does not threaten the bridge performance	Larger areas have sloughed into the channel allowing bank erosion or channel migration or debris build up that adversely affects the performance of the bridge	Massive areas have sloughed into the channel allowing bank erosion or channel migration or debris build up that threaten the bridge and/or approach roadway

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Item 62 Culverts

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

Items 58 (Deck), 59 (Superstructure) and 60 (Substructure) shall be coded 'N' for all culverts.

Rate and code the condition in accordance with the following descriptive codes:

Code	Description
N	Not applicable. Use if structure is not a culvert.
9	No deficiencies.
8	No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused by drift.
7	Shrinkage cracks, light scaling and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
6	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring exists at curtain walls, wingwalls or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
5	Moderate to major deterioration or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment exists. Noticeable scouring or erosion exists at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
4	Large spalls, heavy scaling, wide cracks, considerable efflorescence or opened construction joint permitting loss of backfill. Considerable settlement or misalignment exists. Considerable scouring or erosion present at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
3	Any condition described in code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culvert. Severe scour or erosion present at curtain walls, wingwalls or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
2	Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.
1	Bridge closed. Corrective action may put back in light service.
0	Bridge closed. Replacement necessary.

Question: Item 62 does not appear to consider problems associated with long span metal culverts, e.g. side sway or distortion. Should this item be reworded to address this?
Answer: The 0 to 9 codes each relate to symmetry of shape and curvation or distortion and deflection in general terms. The Culvert Inspection Manual expands on the ratings listed in Item 62 and could be used for additional guidance in evaluation.

In all cases, the NBI rating for item 62 cannot be more than the rating for item 113 if item 113 is rated 3 or less. This will ensure the scour condition is factored into the bridge sufficiency rating which considers item 62 but not item 113. In cases where item 113 is rated 4 or more, item 62 should be coded according to the condition as described in 'Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges'.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Items 63 and 65 Method used to determine Operating or Inventory Rating

On November 15, 2011, the FHWA revised the coding for items 63 and 65. The revised coding descriptions are as follows:

Code	Description
0	Field Evaluation and documented engineering judgment. Typically done when plans are not available. Ratings must be documented.
1	Load Factor (LF)
2	Allowable Stress (AS)
3	Load and Resistance Factor (LRFR)
4	Load Testing
5	No rating analysis or evaluation performed. Use when the bridge has not been load rated or when load rating documentation does not exist.
6	Load Factor (LF) rating reported by rating factor method using MS18 loading
7	Allowable Stress (AS) rating reported by rating factor (RF) method using MS18 loading.
8	Load and Resistance Factor Rating (LRFR) reported by rating factor method using MS18 method using HL93 loadings
A	Assigned rating based on Load Factor Design (LFD) reported in metric tons
B	Assigned rating based on Allowable Stress Design (ASD) reported in metric tons
C	Assigned rating based on Load and Resistance Factor Design (LRFD) reported in metric tons
D	Assigned rating based on Load Factor Design (LFD) reported by rating factor using MS18 loading
E	Assigned rating based on Allowable Stress Design (ASD) reported by rating factor using MS18 loading
F	Assigned rating based on Load and Resistance Factor Design (LRFD) reported by rating factor using HL93 loading

Items 64 and 66 Operating Rating and Inventory Rating

According to the FHWA Coding Guide, items 64 and 66 are three digit fields (XX.X). BrM allows 4 character entries (XXX.X), thus operating or inventory load ratings greater than 100 can be entered into BrM.

Items 64 and 66 are not to be coded for bridges carrying railroad or pedestrian traffic.

For On System bridges, operating and inventory ratings and all related information on the Appraisal tab (Load Rating screen) are maintained by the Bridge Division.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

When to re-evaluate Load Rating for Off-System bridges
A load rating should only be re-evaluated for one or more of the following:

	In general when the	**Example**
A	Bridge has been rebuilt, replaced, or added to the bridge inventory.	
B	Load carrying member has been repaired, replaced, or added to the structure (and the action will significantly change the load rating).	It is doubtful that the addition of one 3"x12" timber stringer would significantly change the load rating of a bridge that currently has 15 other 3"x12" timber stringers in its span.
C	Dead Load on superstructure has changed significantly.	Addition or removal of asphalt, dirt or gravel, or the change of deck or superstructure member.
D	Condition Rating of the deck, superstructure and/or substructure has significantly decreased and the low rating is due to the condition of load carrying members.	A significant change in condition ratings can be defined as: 1. A decrease of two (2) or more rating points if the condition rating is lowered to a four (4), or less. (Inspector should explain on the inspection form the reason for the change). 2. Any decrease in condition rating resulting in a condition rating of four (4) or less. 3. An element is coded in its worst condition state indicating that it warrants analysis and the current load rating does not indicate that the element in its worst condition state was considered.
E	County Commissioner and/or the consultant inspecting the bridge feels the current load rating is in error, or the County Commissioner requests that the load rating be re-evaluated.	

Load Posting
Bridges are load posted based on complex determinations. Load posting is required if any of the following is true:

For bridges rated before 6/1/2018, the following ratings are applied:

On System	Off System
H Op. < 23 tons	H Op. < 23 tons
HS Op. < 36 tons	
3-3 Op. < 45 tons	

For bridges rated after 6/1/2018, the following ratings are applied:

On System	Off System
H Op. < 23 tons	H Op. < 23 tons
HS Op. < 36 tons	HS Op. <36 tons
3-3 Op. < 45 tons	-
EV3 Op. < 43 tons	EV3 Op. < 43 tons
SHV < 40 tons	SHV < 40 tons

* Implements of animal husbandry will be enforced at the AASHTO H configuration.

Refer to Appendix I to aid in the decision on whether or not an on-system bridge should be posted based on the condition of the bridge.
Off-system load posting signs will show a single tonnage. On-system load posting signs will show three tonnages. Refer to Appendix G for an example sign and truck configurations.

Bridge Closings
Bridges are to be closed whenever the 'H' operating rating is less than 3 tons. See Appendix I for bridge closure procedures.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Items 67, 68 and 69 Structural Evaluation, Deck Geometry and Underclearances, Vertical and Horizontal

Question: Is the use of the code N applicable to Items 67, 68 or 69? If yes, please give an example(s).
Answer: Item 67 - Structural Evaluation shall be evaluated for all structure records with the inventory route on the structure and the code of N is not applicable.

For Item 68 - Deck Geometry, all structures that have an Item 51 - Bridge Roadway Width coded greater than zero shall be evaluated. For culverts where traffic is on fill carried across the structure and the headwalls do not affect the flow of traffic and Item 51 is coded 0000 then Item 68 shall be coded N.

For Item 69 - Underclearances, Vertical and Horizontal, a code of N is proper when the structure is not over a highway or railroad.

Item 67 Structural Evaluation

Question: Does Item 67, Table 1, Note 5 apply only to Interstate mainlines or also to Interstate frontage roads?
Answer: The note will apply to all bridges with Item 104 - Highway System of the Inventory Route coded 1 (Interstate).

Question: What do you mean by 'Equivalent HS Loads'? Are you allowing one of the conversion tables to be used to generate the HS load if the HS load is not calculated? If so, which one?
Answer: Equivalent HS loads are the other types of loadings that have been converted by use of factors to arrive at one comparable rating. Factors used are conservative such as those used for conversion for use in Table 1 for Item 67, or average such as those used for the sufficiency rating formula. An Adjusted Inventory Tonnage (AIT) will be calculated and stored using factors for the sufficiency rating. The factors noted in Item 67 will be used to convert the submittal for Item 66.

The inventory and operating ratings using the HS truck are preferred and encouraged.

Item 68 Deck Geometry

Question: A primary system road in an urban area has an ADT of 14,200 vehicles. The undivided roadway has 4 lanes of traffic, 2 in each direction, and is 56 feet 6 inches between curbs. What table is used and what is the code for this bridge?
Answer: The information provided, 3 or more lanes of undivided traffic, fits footnote 3 under Tables 2C and 2D. Therefore, Table 2C, Other Multi-lane Divided Facilities will be used. The example of 56 feet 6 inches falls between the rating codes of 5 and 6 (i.e., 4 x 12 + 12 = 60 feet for a rating code of 6 and 4 x 11 + 10 = 54 feet for a rating code of 5). Therefore, the correct code for the example is 5. Note that the full width of the roadway is used along with both shoulders (full curb-to-curb width).

Item 69 Underclearances, Vertical and Horizontal

Question: In some instances an agreement has been reached with a railroad on a minimum tolerable clearance and Item 69 is not coded now as deficient. A check with the tables for Item 69 in the 1988 Guide indicates that the underclearances will be deficient. How do we code this item - use the accepted agreement or the table?
Answer: All coding for this item will be in accordance with the tables provided without exception. The tables shall also be used without exception for Item 67 - Structural Evaluation and Item 68 - Deck Geometry. The Edit/Update Program will assign codes from 0 or 2 through 9 to these 3 items based on the SI&A sheet data.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Item 70 Bridge Posting

The table below shows the appropriate entry for item 70 based on the load posting sign displayed at the bridge site. Due to new FHWA rules regarding load ratings for an increased number of truck types, item 70 is no longer based solely on the H20 rating (23 tons) for off-system bridges and H20 (23 tons), HS20 (36 tons) or 3-3 (45 tons) for on-system bridges. Type 3 (25 tons), type 3S2 (36 tons), SHV (40 tons) and EV (43 tons) ratings must now also be considered to determine if a bridge must be posted. It is now possible that a bridge is REQUIRED to be posted at a tonnage value higher than 23 tons. Additionally, if the structure is a temporary structure (item 41 = E), then Item 70 must be set to '5'.

Use this table to determine the correct entry for item 70. It is important for the team leader to understand which rating method(s) were used for any given bridge and which method(s) to apply to the table. In general:

a) Most bridges will not require posting. Use item 70 = 5.
b) For off-system bridges posted less than 23 tons, the H20 rating will most likely be used to determine item 70.
c) For off-system bridges posted greater than 23 tons, the SHV or EV rating will be used to determine item 70.
d) For on-system bridges posted less than 23/36/45 tons, the H20, HS20 or 3-3 rating will most likely determine item 70.
e) For on-system bridges posted greater than 23/36/45, the type 3, Type 3S2, SHV or EV rating will most likely determine item 70.

Until the validation sub-routines within BrM for item 70 are updated by the FHWA any validate error for item 70 may be disregarded provided item 70 was determined from this table.

Vehicle	H20	Type 3*	HS20	Type 3S2*	3-3**	SHV	EV	Item 70
P	23+	25+	36+	36+	45+	40+	43+	5
O	22 – 20	24 – 22	35 – 32	35 – 32	44 – 40	39 – 36	42 – 38	4
S	19 – 18	21 – 20	31 – 28	31 – 28	39 – 36	35 – 32	37 – 34	3
T	17 – 16	19 – 17	27 – 25	27 – 25	35 – 31	31 – 28	33 – 30	2
E	15 – 13	16 – 15	24 – 21	24 – 21	30 – 27	27 – 24	29 – 25	1
D	12 or Less	14 or Less	20 or Less	20 or Less	26 or Less	23 or Less	24 or Less	0

* Used only for LRFR calculated load ratings.
** Used only for on-system bridges

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

Item 71 Waterway Adequacy

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

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

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

Adjectives describing traffic delays mean the following:

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

Functional Classification			
Principal Arterials - Interstates, Freeways or Expressways	Other Principal and Minor Arterials and Major Collectors	Minor Collectors, Locals	Description
Code			
N	N	N	Bridge not over a waterway.
9	9	9	Bridge deck and roadway approaches above flood water elevations (high water). Chance of overtopping is remote.
8	8	8	Bridge deck above roadway approaches. Slight chance overtopping roadway approaches.
6	6	7	Slight chance of overtopping bridge deck and roadway approaches.
4	5	6	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays.
3	4	5	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with significant traffic delays.
2	3	4	Occasional overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	3	Frequent overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	2	Occasional or frequent overtopping of bridge deck and roadway approaches with severe traffic delays.
0	0	0	Bridge closed.

Item 92c Other Special Inspection

When a bridge requires an 'Other Special' inspection, then the reason for the inspection will be stated in 'Structure Notes' on the 'Notes' tab.

Item 103 Temporary Structure Designation

For temporary structures, be sure to describe both the original structure plus the temporary structure in the "structure description field" under the inventory tab.

Temporary Bridges which can carry legal loads
When a temporary bridge is in place which is capable of carrying legal loads and there is no posting sign, then Item 41 will be coded 'E' and Item 70 will be coded '5'. This type of structure includes temporary pipes, single or a battery of pipes.

Temporary bridges which cannot carry legal loads
When a temporary bridge is in place which is not capable of carrying legal loads and there is a posting sign, then Item 41 will be coded 'P' and Item 70 will be coded according to the value of the posting sign. The H-Operating rating cannot be used to determine Item 70 since it must be set to '0' for a temporary bridge.

Item 106 Year of Reconstruction
Do not confuse bridge repair with bridge reconstruction. Bridge reconstruction generally consists of major repairs to both the deck and the superstructure and generally adds traffic carrying capabilities to the bridge. Do not enter a year of reconstruction for minor bridge repairs.

Item 108a Type of Wearing Surface

When item 108a is coded for bare concrete decks or slabs, typically code 1 for Monolithic Concrete (concurrently placed with structural deck) is used. However, in some cases this may not be the correct coding. Code 0 for None (no additional concrete thickness or wearing surface is included in the bridge deck) may sometimes be the correct code. Before the 1970's, bridge decks were poured with 1 inch of concrete cover but this posed problems with the use of salt in the winter. The problem was addressed by pouring decks with 2 1/2 inches of cover beginning in the 1970's. The correct coding of item 108a is to use code 0 for bridges with just 1 inch of cover over the rebar and use code 1 for bridges with 2 ½ inches of cover over the rebar. There are probably not many bridges with just 1 inch of cover as they may have been replaced or overlaid. If the deck has been overlaid, then neither code '0' nor '1' is applicable.

Item 113 Scour Critical Bridges

Prior to inspecting a bridge, the inspector must review the bridge file to see if bridge has been classified as scour critical. If so then the inspector should consult the plan of action to identify any special measures that should take place during inspection.

SPANS

Scour evaluations and assessments are to be done one time only for each span bridge by an engineer and coded accordingly. This code should not be changed by inspectors without consulting the engineer and documenting the reason for the change. At this time, all on system span and off system span structures have been evaluated.

NEW BRIDGES - All multi-span structures constructed since 1994 have included scour analysis and foundations have been designed for maximum scour. Code item 113 = 8. In all cases, item 113 must be compared to item 60. For a span bridge, Item 60 cannot be more than item 113. This will ensure the scour condition is factored into the bridge sufficiency rating which considers items 60 but not item 113. Also, in all cases, if item 113 is 5 or less, the Scour Smart Flag (961) must also exist.

Always use engineering judgment when undecided. Think about painting the big picture and what information you are trying to convey to bridge owner.

Code	Description
N	Bridge not over waterway.
U	Bridge with "unknown" foundation that has not been evaluated for scour. At this time, all on system span and off system span structures have been evaluated. Please consult bridge maintenance file for scour computations, plan of action or off system scour assessments. Please do not code a U unless you have checked everywhere.
9	Bridge foundations (including piles) on dry land well above flood water elevations.
8	Bridge foundations determined to be stable for the calculated scour condition. Scour is determined to be above top of footing by assessment. When entering a new bridge in BrM, item 113 = 8.
7	Approved countermeasures have been installed to mitigate an existing problem with scour. 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. Countermeasures have performed well for complete 2 year inspection cycle.
6	Do not code a 6.
5	Bridge foundations determined to be stable for calculated scour condition. Scour determined to be within the limits of footings or piles by assessment. Countermeasures for scour have been installed. Monitor for two years, if performing after two year change to 7. If countermeasures fail, change to appropriate rating. Countermeasure for spans structures must be approved to be changed.
4	Bridge foundations determined to be stable for calculated scour conditions. Field review indicates action is required to protect exposed foundations.
3	Bridge is scour critical; bridge foundations determined to be unstable for ***calculated*** scour conditions: - Scour within limits of footing or piles.- Scour below spread-footing base or pile tips.- Never code in field
2	Bridge is scour critical; ***field*** review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by: - a comparison of calculated scour and observed scour during the bridge inspection, or - an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60.
1	Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic. Failure is imminent based on field visit by PE. Contact Maintenance Engineer and Hydraulic Engineer.
0	Bridge is scour critical. Bridge has failed and is closed to traffic.

APPENDIX C
NBIS ITEMS WITH ODOT GUIDELINES

CULVERTS

Inspectors are to code all bridge length culverts for scour. This is to be done at every inspection. Start at the top of the list below and read down until the wording is applicable to your culvert. In all cases with multiple situations, the worse situation controls.

Always use engineering judgment when undecided. Think about painting the big picture and what information you are trying to convey to bridge owner.

Code Description

8 Scour is determined to be above top of floor by assessment. When entering a new bridge culvert in BrM, item 113 = 8.

7 Approved countermeasures have been installed to mitigate an existing problem with scour. 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. Countermeasures have performed well for complete 2 year inspection cycle.

5 Countermeasures for scour have been installed. Monitor for two years, if performing after two year change to 7. If countermeasures fail, change to appropriate rating. Countermeasure for spans structures must be approved to be changed.

History of Scour Problems	Curtain wall present	Flowline	Inspection Frequency: once every...	Item 113 Code	Scour Smart Flag 961 Code
Yes	No	Channel flowline is below wall or barrel with significant barrel or wing wall undermining present. Wing or barrel wall cracking with seepage has occurred. Standing water is present upstream of RCB and/or through barrel.	6 Months	2	CS 4
		Culvert flowline = or > 2 feet above stream flowline with **significant undermining** of barrel or apron.	6 Months	2	CS 3
		Culvert flowline = or > 2 feet above stream flowline. **Minor or insignificant undermining** of barrel or apron may be present.	Two years	3	CS 2
		Culvert flowline < 2 feet above stream flowline	Two years	4	CS 1
	Yes	Channel flowline is below toe of curtain wall or barrel with significant barrel, wingwall or apron undermining present. Wing or barrel wall cracking with seepage has occurred. Standing water is present upstream of RCB and/or through barrel.	6 Months	2	CS 4
		Toe of curtain wall above stream flowline with **significant undermining** of curtain wall.	6 Months	2	CS 3
		Toe of curtain wall above stream flowline. **Minor or insignificant undermining** of curtain wall may be present.	Two years	3	CS 2
		Toe of curtain wall below stream flowline.	Two years	4	CS 1
	Channel cutting behind wing walls (see Note 1). Stream is meandering and/or degrading, and attacking the fill behind the wing wall.		6 Months	2	Wing not undermined CS 2
					Wing is undermined CS 3

In all cases, item 113 must be compared to item 62. This will ensure the scour condition is factored into the bridge sufficiency rating which considers items 62, but not item 113. For culverts where item 113 is rated 4 or more, item 62 should be coded according to the condition as described in 'Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges'.
Also, in all cases, if item 113 is 5 or less, the Scour Smart Flag (961) must also exist.

APPENDIX D
GLOSSARY OF TERMS

Abrasion
Wearing or grinding away of material by water laden with sand, gravel or stones.

At-Grade
The top slab of the RCB (zero ft. of fill) is used as the driving surface.

Beam Ends
A 5 ft. stringer/girder beam end is the portion of a stringer or girder which would be susceptible to higher deterioration rates if any joint (fixed or expansion) were open and leaking. All stringer/girder beams have 2 beam ends regardless of joint type and location with the exception of the following:

1. Stringer/girders with integral abutments
2. Stringer/girders with timber or steel decks
3. Reinforced concrete stringer/girders
4. Piers where the deck is a continuous pour

Bridge Joint
A bridge joint is a full depth gap in steel, concrete (typically a deck), or approach roadway to allow for the thermal expansion and contraction of the superstructure. The joint may or may not have filler material to prevent infiltration of moisture or debris. Typically the gap is created during the original construction, but could arise due to a shift in the structural dynamics of a bridge or poor construction methods or techniques. Also, a gap will be considered a joint if the gap has been sealed with the intent to prevent moisture and debris infiltration of the superstructure or water infiltration of the substructure (i.e., prevent water from getting behind an abutment and eroding approach roadway fill.).

Channel Profile
Taken at the following locations when NBI item 113 is 3 or less for
both span bridges and culverts:

1. Each foundation unit
2. Where slope grade changes
3. At water edges
4. At maximum depth of water (Channel Flow Line)
5. Edges and high points of debris piles
6. Other locations that could change over time and are not incorporated in the measurements above

(See BrM manual pages 111 and 112 for more information.)

Column
A substructure unit that supports a cap. A column is a substantial member strong in compression. Four or fewer columns usually support a cap. Judgement should be used in the field to differentiate between a pile and a column.

Consolidation (Soil)
Any event which causes hidden piles to become exposed. This includes soil settling, and wind or water erosion.

Culvert
Culverts are generally covered with fill and are composed of structural material around the entire perimeter of the opening, although some are supported on spread footings with the streambed serving as the bottom of the culvert. Some culverts may have traffic bearing directly on top of the structure (at grade). Culverts generally tend to be founded in soil with curtain walls to provide scour protection.

CX
The bridge condition is bad enough that there is a possibility of the failure of a major structural component if repairs are not completed immediately or within the next few days.

APPENDIX D
GLOSSARY OF TERMS

Debris
An accumulation of any object which obstructs the flow of water beneath a bridge. This includes natural and man-made objects.

Deep Pitting
Active corrosion is causing section loss of small portions of steel. The corrosion is more inward into the section of steel rather than spreading into large areas. The amount of section lost to deep pitting is measurable and is more than 15% of the total thickness of the member.

Delamination
Subsurface separation of concrete into layers, usually starting at rusted rebar. It makes a hollow sound when you tap on it with a hammer or drag a chain across it.

Efflorescence
A white deposit on concrete or brick caused by crystallization of soluble salts brought to the surface by moisture in the masonry or concrete.

Erosion
Displacement of soil particles on the land surface due to such things as water or wind action. The wearing away or eroding of material on the land surface or along channel banks by flowing water or wave action on shores.
At Piers - Wearing away of soil caused by the flow of water within the river or creek. May cause pier foundations to become exposed.
At Abutments - Wearing away of soil caused by the flow of rain water around abutments or through leaking joints. May cause abutment foundations to become exposed or loss of wingwall or backwall support.

Exfoliation
Active corrosion is causing section loss of large portions of steel due to rust expansion and flaking away of the corroded steel.

Finish Grade
Two ft. of fill, or less, measured from the top slab of an RCB or the apex of an arch.

Flow Line Measurement
Taken at a benchmark location (i.e. top of curb, top of railing, etc.) and measures the deepest part of the channel (thalweg measurement). This measurement is recorded for each inspection. (See BrM manual pages 111 and 112 for more information.)

Freckled Rust
Numerous small spots of rust in what appears to be an otherwise sound paint system. Observed when the paint system is in the early stages of failure.

FX
The bridge condition is such that repair should not be necessary any time soon, but should be monitored each inspection cycle to determine whether the condition is worsening to the point of requiring a PX coding.

Functionally Obsolete
See Appendix BB in the BrM Office Manual.

Hand Railing
Railing designed to be used by pedestrian traffic only.

Impending Pot-hole
Irregular shaped, disintegrated areas of bridge deck where the surface material is degraded, but has not completely loosened from the substrate allowing it to be removed from the deck. Use the amount of truck traffic and use of road salt to determine the potential to become a pothole by the next inspection.

APPENDIX D
GLOSSARY OF TERMS

Insignificant
Too small or unimportant to be worth consideration. Subjective and relative to the overall problem at individual location. Use engineering judgement.

Linkage Block
A section of concrete poured between the ends of PCBs in a continuous span concrete bridge.

Paint Curling
Portions of the paint system are beginning to lose adhesion to the steel, primer or previous coating and the edges of paint defects are curling away from the member.

Paint Peeling
The paint system has lost adhesion to the steel, primer or previous coating and large sections of paint are missing or can be easily removed.

Paint Chalking
The surface of the paint system has a powdery light color appearance. It will rub off and leave a powdery residue on the object rubbed against it.

Patch Geometry
The following illustrations show acceptable and unacceptable patch geometry as per section 513 of the construction manual.

Permanent Patch
A patch made using a modified Duracal mix (Class B and C patches). Also the patch was made during a repair project (with plans in the bridge folder) and the patch has the proper geometry (see definition of patch geometry). Permanent patches will be assumed to be as good as the deck and rated as such.

Pier Wall - Structural substructure unit supporting the superstructure.

Pile
Substructure unit that supports a pile cap or abutment or wingwall. Four or more piles are required to adequately support a pile cap or abutment. Generally, piles are driven in-place. Judgment should be used in the field to differentiate between a pile and a column.

Pop-outs
Conical fragment broken out of a concrete surface by pressure from reactive aggregate particles usually found at the bottom of the hole

Pot-hole
Irregular shaped, disintegrated areas of bridge deck or approach pavement concaved by the failure of the surface material.

Post-Tensioned Concrete Pier Beam
Takes the place of a pier cap but is considered part of the superstructure. A post-tensioned pier beam is not considered fracture critical.

Protected Deck
A concrete deck or slab may have one of several systems used to protect the concrete from deterioration caused by corrosion of internal reinforcement or penetration of salt or other chemicals. A protected deck or slab will have one of the following protective systems: membrane, epoxy coated bars, DPWR (Silane/Chemtrete),

galvanized bars, stainless steel bars, stainless steel coated bars, MMFX bars, DPWR with epoxy coated bars or Penetrating Surface Applied Corrosion Inhibitor (PSACI).

PX
The bridge condition is such that immediate repair is not necessary, but should probably be completed within the next several weeks or months to prevent it from becoming a serious problem to a major structural component.

Raveling
Areas where the asphalt has oxidized and rocks are loose.

Rutting
Depressions formed parallel to the vehicle wheel paths. There typically will be separate rutting formed for the left and right wheels of a vehicle.

Scaling - Loss of concrete paste.

Section Loss
Loss of a member's cross sectional area usually by corrosion (such as exfoliation or deep pitting) or decay.

Scour
The displacement and removal of channel bed material due to flowing stream water; usually considered as being localized as opposed to general bed degradation. The result of the erosive action of running water that excavates and carries away material from a channel bed. Scour in a channel that is localized at a pier, abutment, or other obstruction to flow. Local scour is caused by the acceleration of the flow and the development of a vortex system induced by the obstruction to the flow. Of primary importance when the erosion is in the immediate vicinity of the bridge structure and is threatening the structural integrity of a bridge substructure element.

Serviceability
Serviceability of the element should be interpreted as the following: If condition of the element has deteriorated to a point that the load capacity of the structure has possibly been reduced to posting level, posted, or caused the structure to be closed.

Shoving
Ridges formed when asphalt expands but cannot move freely due to a bridge approach slab or other obstacle. The asphalt applies pressure on the object and also rises, possibly into the traffic area of the approach roadway. The ridges are perpendicular to traffic flow. Shoving has an appearance similar to a washboard.

Significant
Sufficiently great or important of attention; noteworthy. Subjective and relative to the overall problem at individual location. Use engineering judgement.

Smart Flag
An indication of a specific bridge deficiency that is difficult to model due to its irregular occurrence. Smart Flags are not assigned to a bridge until the condition exists which the smart flag was designed to model.

Soffit
The under surface of a deck or slab. For rating purposes, the soffit includes the fascia of the deck or slab.

Spalling
Circular or oval depression in concrete caused by a separation of a portion of the surface concrete, revealing a fracture parallel with or slightly inclined to the surface.

APPENDIX D
GLOSSARY OF TERMS

Span Bridge
A structure, including deck, superstructure and substructure components, erected over a depression or obstruction (such as waterway, highway or railway) and designed to carry vehicular, pedestrian or railway traffic. Span bridges generally are founded on solid rock and carry no fill.

Steel Floorbeam
A primary horizontal member located transversely to the general bridge alignment. A steel floorbeam connects 2 halves of a bridge and is considered fracture critical if the floorbeam spacing is greater than 14'. Members can frame into or be supported by a steel floorbeam.

Steel Pier Beam
A steel pier beam takes the place of a reinforced concrete or timber pier cap. A steel pier beam is considered fracture critical and is considered a part of the superstructure. Members can frame into or be supported by a steel pier beam. (Generally steel pier beams have 3 or fewer supports and the failure of a pier beam would result in the loss of a large part of, or an entire, superstructure. Engineering judgment should be used in differentiating between a steel pier beam and steel pier cap.)

Steel Pier Cap
A steel pier cap takes the place of a reinforced concrete or timber pier cap. A steel cap is not considered fracture critical and is a part of the substructure. Members can frame into or be supported by a steel pier cap. (Generally a steel pier cap is supported by 4 or more supports. Engineering judgment should be used in differentiating between a steel pier beam and steel pier cap.)

Structurally Deficient
See Appendix BB in the BrM Office Manual.

Traffic Railing
Railing that is designed to resist traffic impact.

Temporary Patch
A patch made using asphalt or an unmodified Duracal mix. Also, the patch has an inacceptable geometry (see definition of patch geometry).

Web Wall - Provides lateral stability between columns. It carries no load from the superstructure.

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APPENDIX E
FOLLOW-UP REVIEW RECOMMENDATIONS

All FX, PX, and CX repair recommendations are to be recorded at the beginning of the element notes or inspection notes, as applicable. Please make sure that all FX, PX, and CX's are typed in all caps to draw attention. The rest of the notes need not be typed in all caps. It is also not necessary to include exclamation points (!), asterisks (*), dashes (-), or any other type of symbol or text for emphasis on the recommended repairs. If the inspector feels that repairs are urgent enough for extra text or symbols, please notify the bridge owner with your concerns immediately. Following are examples of the desired type of notes with FX, PX or CX repair recommendations:

Example:

FX - SOME SMALL POPOUTS IN THE WHEEL LANES WITH MINOR WEAR. HOLES ARE PRESENT WHERE OLD REFLECTORS WERE ANCHORED IN DECK (1 TO 2 INCHES DEEP).

PX - Heavy cracking at the seat with spalls developing. Moderate scaling to the seats and lower face areas between each pedestal on the East and West with some cracking developing.

CX - SCOUR OF 7' TO 12' EXISTS UNDER THE NW CORNER OF THE WEST ABUTMENT. 2' OF THE APRON IS BROKEN OFF. Scour extends 3' below and 6' to 8' under the remainder of the apron downstream.

Dated photographs are required for all elements with PX or CX repair recommendations.

Definitions

FX
For this level of repair recommendation, the condition poses a potential future threat to the structural integrity of the bridge but repair should not be necessary any time soon. The condition should be monitored each inspection cycle to determine whether it is worsening to the point of requiring a PX coding. Some examples of situations that would require a FX repair recommendation are:

1. A timber pile that has a few small localized hollow spots.
2. An RCB where drift buildup has blocked 10% of the opening.
3. A crack in the compression zone of the web of a steel girder or in a diaphragm (provided the diaphragm is not in a curved beam/girder system).
4. Scour at an RCB that has not undermined the bottom slab.
5. A steel roller shoe that is just starting to have section loss due to rust.
6. Erosion 3' under a bridge seat.
7. Spalling at a pier cap that is close to, but not under, a bearing plate.
8. A steel rolled I-beam girder that has moderate section loss above a bearing.
9. A small crack in the corner of a stringer to floorbeam connection angle.

APPENDIX E
FOLLOW-UP REVIEW RECOMMENDATIONS

PX

For this level of follow up review recommendation, the condition poses a probable future threat to the structural integrity of the bridge. Immediate repair is not necessary, but repairs should probably be completed within the next several weeks or months to prevent it from becoming a serious problem to a major structural component. Some examples of situations that would require a PX repair recommendation are:

1 . A 2" diameter hole in a steel girder web above a bearing.
2. An RCB where drift buildup has blocked 50% of the opening.
3. A small crack in the tension flange of a steel girder of a five girder bridge.
4. Heavy debris buildup on top of a bridge seat around steel shoes.
5. Scour at an RCB that has undermined the bottom slab.
6. A steel roller shoe that is in maximum expansion.
7. Erosion under an approach slab.
8. Spalling at a pier cap that is getting under a bearing plate.
9. A missing bridge end marker.
10. A channel that has moved behind a wingwall of an RCB.

CX

For this level of follow up review recommendation, the condition should be bad enough that there is a possibility of the failure of a major structural component. For both on and off systems, the repair must be completed within the next 90 days or the bridge must be closed. Refer to Appendix I. Any bridge with a CX repair recommendation must have the Other Special inspection frequency set to six (6) months. At the next Other Special inspection, if the bridge is not fixed, it must be closed. If the bridge has been fixed at the 6 month inspection, the Other Special inspection can revert to its previous inspection frequency, if applicable, or if the Other Special inspection were scheduled solely because of the CX repair recommendation the Other Special inspection requirement can be removed. Some examples of situations that would require a CX repair recommendation are:

1. A large hole in a steel girder web above a bearing.
2. An RCB where the channel is flowing under the bottom slab.
3. A small crack in the tension flange of a truss floorbeam.
4. A steel roller shoe that is starting to crush.
5. A large vertical crack in a PCB near midspan.
6. A large horizontal crack in a concrete pier column.
7. A vertical clearance sign that reads higher than the measured clearance.
8. Settlement to a timber pile bent.
9. Loose concrete over a traffic lane (bridge closure not required, but the affected traffic lane must be closed at the bridge).
10. Missing or incorrect load posting sign.
11. Loose expansion joint.

These are conditions that pose an IMMEDIATE threat to the structural integrity of the bridge and affect the load capacity of either the member or the bridge. The bridge must either be fixed or closed.

You may leave a CX as a 24 month inspection if the bridge is closed or temporary. Put a space in between the C and X so it will not show up on the error check reports.

APPENDIX F
INSPECTOR VERIFIED ITEMS

Each user will have a unique login ID and password and will be uniquely identified to the database upon login. BrM allows individual data entry items to be made visible or not visible to individual users and, if visible, they can be made editable or read-only. This is based on the level of permissions assigned to each user. The permission levels include:

- Browser (read only)
- Team Leader
- Program Manager
- Admin (full access)

Each person allowed access to BrM will be assigned to one of these permission levels. In a few cases a team leader may also be assigned program manager permissions. Also, BrM allows users to access only those bridges for which they are responsible. For example, if your agency inspects only bridges within a specific county or city, then you will be allowed access to only bridges within that county or city.

All data fields will be visible to any person logged in to the database, but not all fields will be editable. For any field that is editable, it will be the inspector's responsibility to verify the accuracy and update the data as appropriate. Any field presented as read-only may not be edited by the inspector, however if the information is known to be incorrect, the inspector should contact the Bridge Maintenance office to have it corrected.

All bridge information is presented under one of two tasks:

- Inspection
- ODOT Inspection

The standard data fields are presented under the 'Inspection' task. The inspector is responsible for verifying and correcting all editable fields. The sufficiency rating, SD/FO status, structure evaluation, deck geometry and underclearances (items 67, 68 and 69) cannot be edited directly, but are determined from other editable items. ADT is to be verified by the inspector only for Off System bridges, based on available resources or observation during the inspection. Load ratings are to be verified by the inspector for Off-System bridges only.

The Oklahoma customized data fields are presented under the 'ODOT Inspection' task. Beneath the 'ODOT INSPECTION' task are two subtasks:

- Inspector Items
- Bridge Div. Items

The inspector is responsible for the accuracy of items under the 'Inspector Items' subtask and the Bridge Maintenance office is responsible for the accuracy of items under the 'Bridge Div. Items' subtask. Items under the 'Bridge Div. Items' subtask are viewable by the inspector but any errors noted should be reported to the Bridge Maintenance office for correction.

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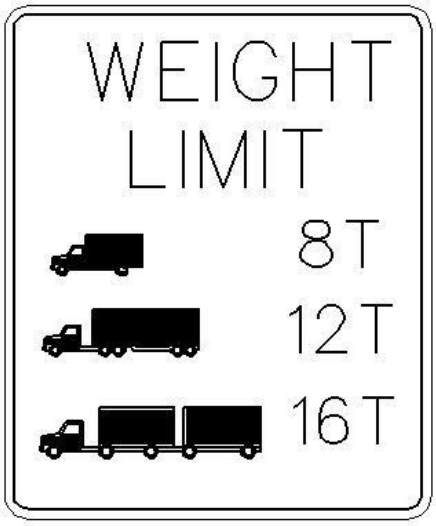
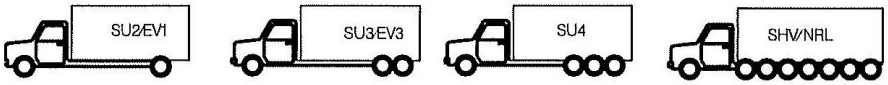
APPENDIX G
BRIDGE SIGNAGE

WEIGHT LIMIT SIGN

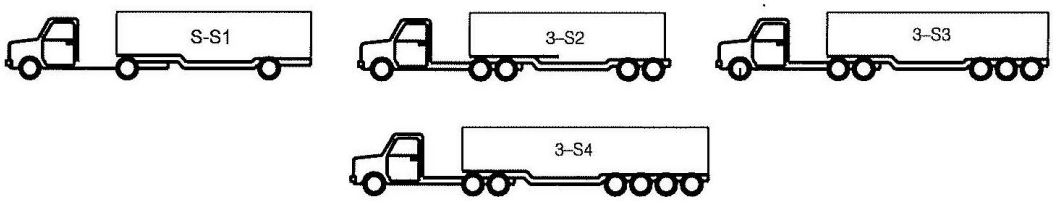


SCENARIO IDENTIFICATION & DEFINITION
(EXAMPLES)

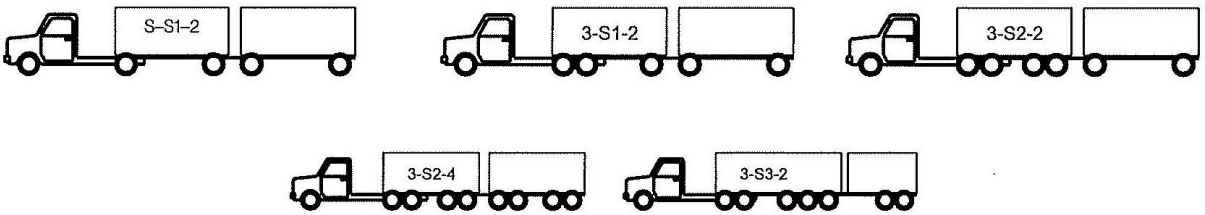
Configuration A – Single Unit Trucks



Configuration B – Tractor–Semitrailer Combinations



Configuration C – Double–Trailer Combinations



APPENDIX G
BRIDGE SIGNAGE

Minimum Clearance Posting And Advance Warning Signs

Minimum clearance posting signs (W12-2a) and Advance Warning signs (W12-2) shall be placed in compliance with the latest version of the Manual on Uniform Traffic Control Devices (currently the 2009 edition). Minimum clearance signs are to be placed on all bridges, visible to traffic approaching the bridge from either direction. Advance warning signs are to be placed for all bridges where the posted vertical clearance is less than 15 feet. The advance warning sign together with a supplemental distance plaque should be placed at the nearest intersecting road or wide point in the road at which a vehicle can detour or turn around.'

W12-2

W12-2a

Narrow and One Lane Bridge Signs

Narrow bridge signs (W5-2) are to be placed in advance of any bridge or culvert having a two-way roadway clearance width of 16 to 18 feet, or for any bridge or culvert having a roadway clearance width less than the width of the approach travel lanes.

One Lane Bridge signs (W5-3) are to be placed on two-way roadways in advance of any bridge or culvert having either:

A. A clear roadway width of less than 16 feet
B. A clear roadway width of less than 18 feet when commercial vehicles constitute a high proportion of the traffic
C. A clear roadway width of 18 or less where the sight distance is limited on the approach to the structure.

W5-2

W5-3

APPENDIX H
IDENTIFYING SINGLE/MULTIPLE ROUTES BENEATH A BRIDGE

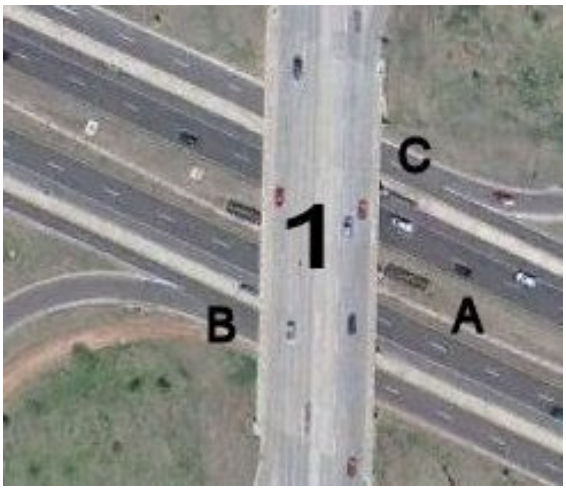
Oklahoma has implemented an effort to correctly record multiple routes beneath a bridge. This is in accordance with the Federal Coding Guide and we should have been doing this all along. About 165 bridges have been identified as having more than one route beneath the bridge. The purpose of this appendix is to identify what does and does not qualify as a separate route beneath a bridge.

Oklahoma inspectors should be able to recognize the presence or absence of multiple routes beneath a bridge. However, if the need for a change in multiple routes is noticed during an inspection, please notify Bridge Division ASAP and we will make the necessary change in the BrM master database to correspond to the new or deleted route. Do not let this information wait weeks or months for the inspection data to be entered into BrM and reviewed before submittal to Bridge Division. Due to OkiePROS automated truck routing, this information should be changed in BrM, as well as the OkiePROS program, as soon as the need for change is known.

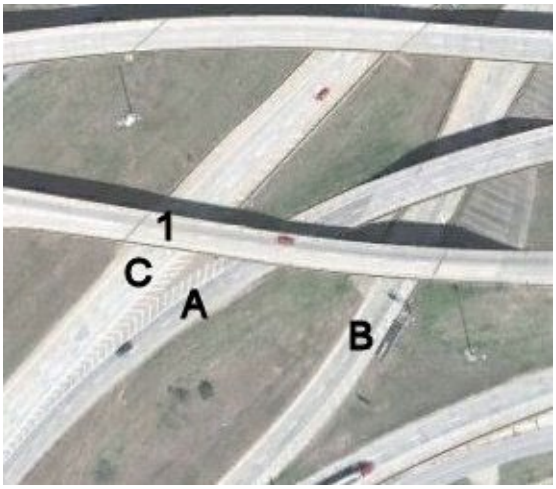
Multiple Routes

Routes beneath a bridge are considered multiple routes whenever one of the following conditions exist. Multiple routes beneath a bridge are identified in BrM as On/Under = ‘A’, ‘B’, ‘C’, etc.

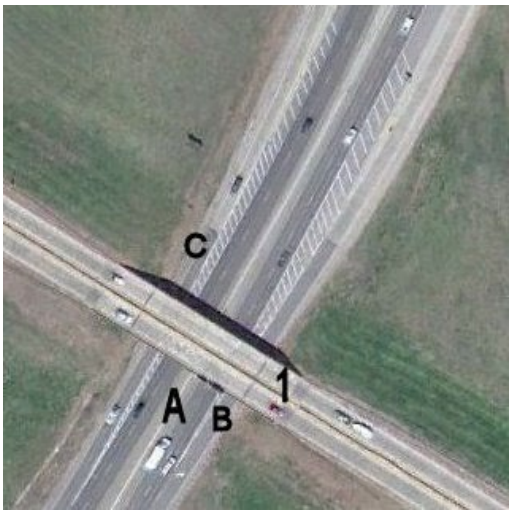
1. The lanes beneath the bridge are separated by a physical barrier; such as curbs, piers, walls, grass, etc. This is common for collector/distributor lanes beneath a bridge, as well as on and off ramps.



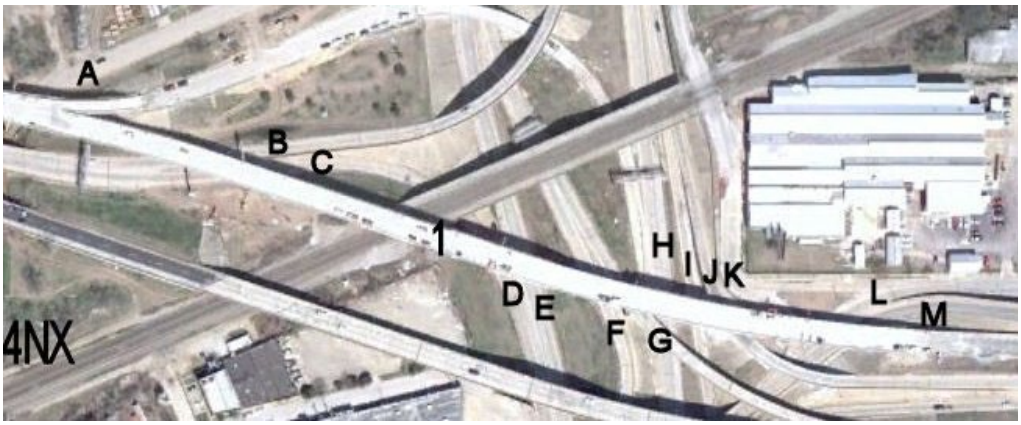
2. A median between opposite directions of travel beneath a bridge does not make multiple routes beneath the bridge. However, if there is a separate ramp or roadway in the median between the two directions of travel of the same highway, then the two directions of travel will be separate routes and the separate ramp or roadway will be a third route beneath the bridge.



3. The lanes beneath the bridge converge or diverge with solid striping (generally with diagonal stripe added) separating the lanes. The solid striping must extend through the entire width of the bridge. If it begins or ends beneath the bridge, then the lanes do not constitute multiple routes. This is common for on and off ramps.

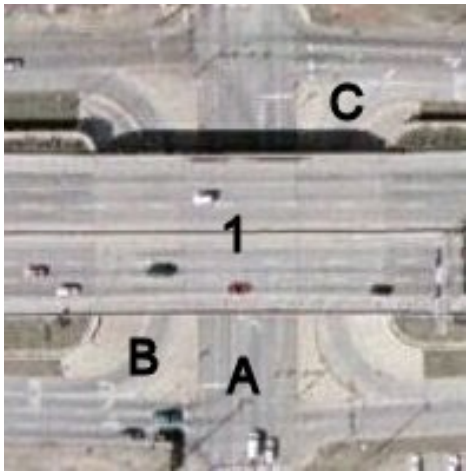


4. Separate highways or roadways come together (but do not join into a single roadway) to pass beneath the bridge.

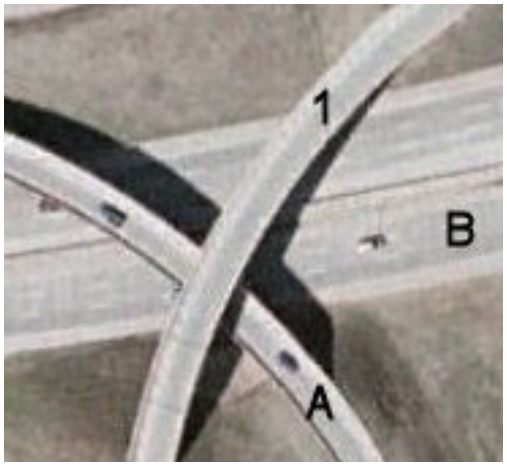


5. Highways with service or frontage roads.

6. Texas turn-arounds.



7. Routes passing vertically beneath a bridge on separate roadways. In the event the middle roadway is a divided highway and the crossing consists of two separate bridges, then each bridge is given a separate route assignment.



Single Routes

The following situations are not considered multiple routes. Single routes beneath a bridge are identified in BrM as On/Under = '2'.

1. The roadway beneath the bridge is widened by one or more lanes for on and/or off ramps, but the lanes are parallel to the main traffic lanes and there exists just a single solid or dashed stripe to mark the lane.

2. Toll booth gates where the only barrier between lanes is the toll both itself.

3. Two-way divided traffic for the same highway beneath the bridge, regardless of the width of the median or the presence of curbs, piers, walls, etc.

4. Railroads, bike paths, etc.

APPENDIX I
BRIDGE CLOSURE/POSTING/CX FOLLOW-UP PROCEDURES

Bridges are to be closed whenever the 'H' operating rating is less than 3 tons. The following sections describe the bridge closure procedures for On and Off System bridges.

On System Bridge Closure

Figure I-1 is intended to aid in the decision on whether or not an on-system bridge should be closed based on the condition of the bridge.

Off System Bridge Closure/Posting/CX Follow-up

State statutes 730:10-3-7 require the closure of bridges rated less than three (3) tons within 30 days of notification. Load posting sign changes must also be completed within 30 days. Critical findings (CX's) require repair or closure within 90 days. Table I-1 shows the steps to be taken to ensure prompt and proper closure, sign change or CX follow-up by the inspecting agency. Figure I-2 further illustrates these steps. Figure I-3 illustrates required signage to be used in cases of bridge closure, both with or without a detour.

APPENDIX I
BRIDGE CLOSURE/POSTING/CX FOLLOW-UP PROCEDURES

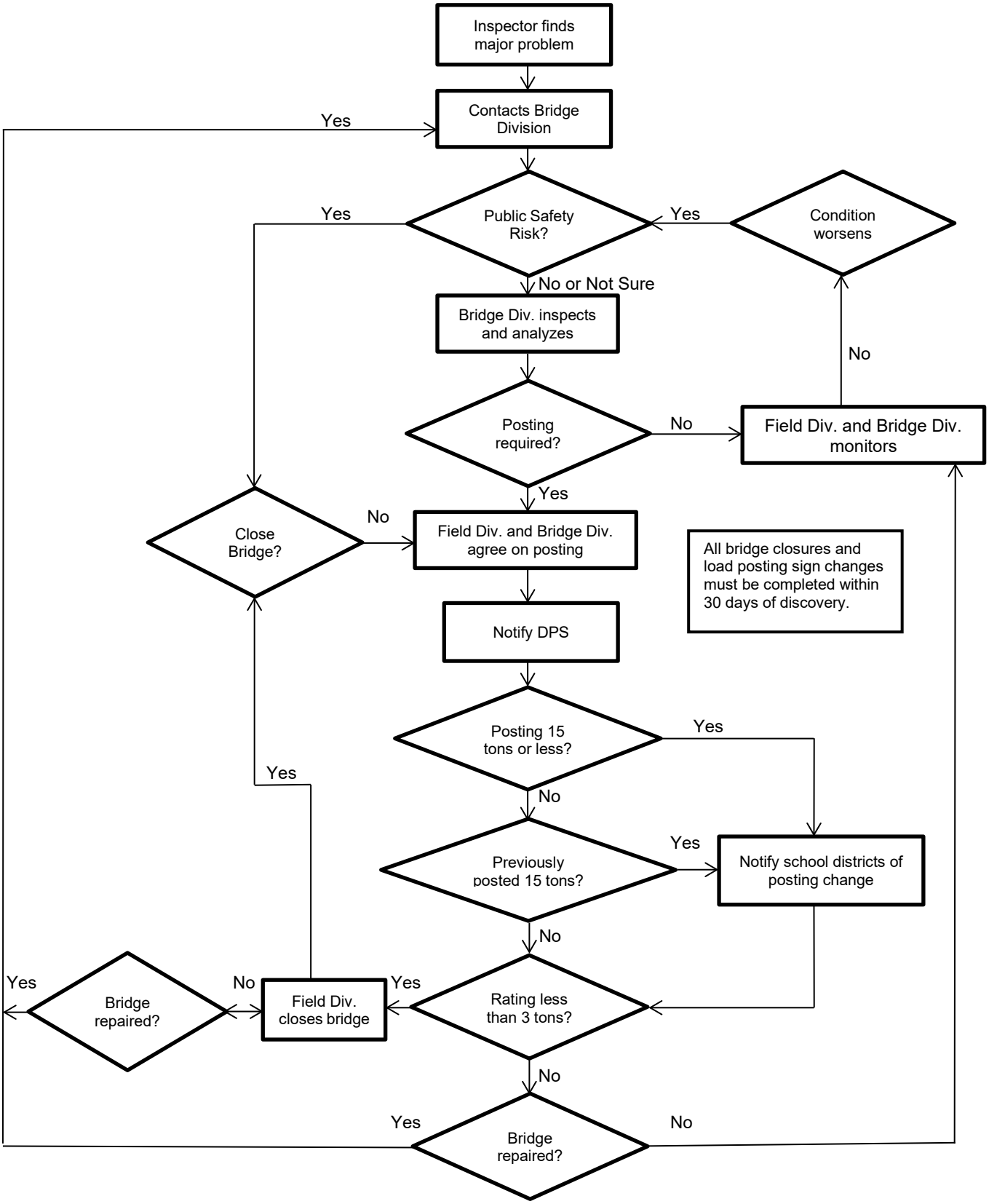


Figure I-1. Bridge Closure Procedure for On-System Bridges

APPENDIX I
BRIDGE CLOSURE/POSTING/CX FOLLOW-UP PROCEDURES

Off System Bridge Closure/Posting/CX Follow-Up				
	Action	**CX Time Line ****	**Closure Time Line ****	**Load Posting Sign*****
CX	1. The bridge inspection **team leader** shall notify the bridge owner of the critical finding (CX) from the bridge site on the date of discovery. The date/time of contact should be noted in the Pontis Inspection Notes.	Day 1	N/A	N/A
CX	2. The **program manager** shall notify the bridge owner in writing of the critical finding. A copy of this notification is to be sent to ACCO, the proper ODOT Field Division Engineer, Field Division County Bridge Coordinator, Bridge Division Field Service Engineer, as well as the Local Government Division Engineer. Notification should be received no later than 3 days after discovery. a. The document shall contain photos of the condition or member with the CX finding or condition. b. The document shall make repair recommendations to the bridge owner for completion to mitigate the CX finding or condition. c. The document shall convey responsibility to the owner for failure to properly follow-up with the recomended repair. d. The document shall contain an action summary report if the superstructure or substructure NBIS ratings are rated at a '2'.*	Day 3	N/A	N/A
CX	3. The **program manager** will schedule a meeting with the owner to discuss the findings and recommendations.*	Day 7	N/A	N/A
CX	4. The **ODOT Field Division County Bridge Coordinator** will appear at the county commissioner's meeting to discuss the findings and recommendations with the county commissioner.	First Available	N/A	N/A
CX	5. The **program manager** shall follow-up with the bridge owner within 14 days of discovery to determine the progress of repairs.	Day 14	N/A	N/A
CX	6. The **program manager** shall follow-up with the bridge owner within 28 days of discovery to determine the progress of repairs. If the owner has been non-responsive, the **program manager** shall contact the **ODOT Field Division County Bridge Coordinator** for assistance to facilitate a plan of action to complete repairs.*	Day 28	N/A	N/A
CX	7. The **program manager** and **ODOT Field Division County Bridge Coordinator** will maintain contact with the owner to monitor repair activities. If at the end of 60 days no action has been taken, the **program manager** will revise the CX letter to a closure letter.	Day 60	N/A	N/A
CLOSURE/POSTING	The **program manager** shall notify the bridge owner in writing of bridge closure/posting recommendations. A copy of the closure/posting notification is to be sent to ACCO, the proper ODOT Field Division Engineer, Field Division County Bridge Coordinator, Bridge Division Field Service Engineer, as well as the Local Government Division Engineer. a. The document shall contain photos of the condition or member which is the causation of the closure/posting recommendation. b. The document shall contain schematics/recommendations to render the bridge impassable after closure. c. The document shall convey resonsibility to the owner for failure to properly render the structure impassable in the appropriate time frame.	Day 60	Day 1	Day 1
CLOSURE/POSTING	8. The **program manager** will schedule a meeting with the owner to discuss the findings and recommendations.*	Day 67	Day 7	Day 7
CLOSURE/POSTING	9. The **ODOT Field Division County Bridge Coordinator** will appear at the county commissioner's meeting to discuss the closure/posting recommendation with the county commissioner.	First Available	First Available	First Available
CLOSURE/POSTING	9. The **program manager** will follow up with the owner 14 days after issuance of the closure/posting recommendation.	Day 74	Day 14	Day 14
CLOSURE/POSTING	10. The **program manager** will follow up with the owner 28 days after issuance of the closure/posting recommendation.	Day 88	Day 28	Day 28
CLOSURE/POSTING	11. If the **program manager** has received no response or indication of closure/posting at 30 days ODOT will coordinate with the FHWA to withhold federal funding.	Day 90	Day 30	Day 30

If at any point during the CX/Closure/Posting timelines action has been taken by the owner to mitigate the outstanding issues, the **program manager** will notify ODOT for updating the BrM database.

* - If required

** - Maximum time frames. Issues may exist that warrant more expediant action on the part of the program manager or owner.

*** - As required by contract and FHWA.

Table I-1. Off-System Bridge Closure/Posting/CX Follow-up Procedures

APPENDIX I
BRIDGE CLOSURE/POSTING/CX FOLLOW-UP PROCEDURES

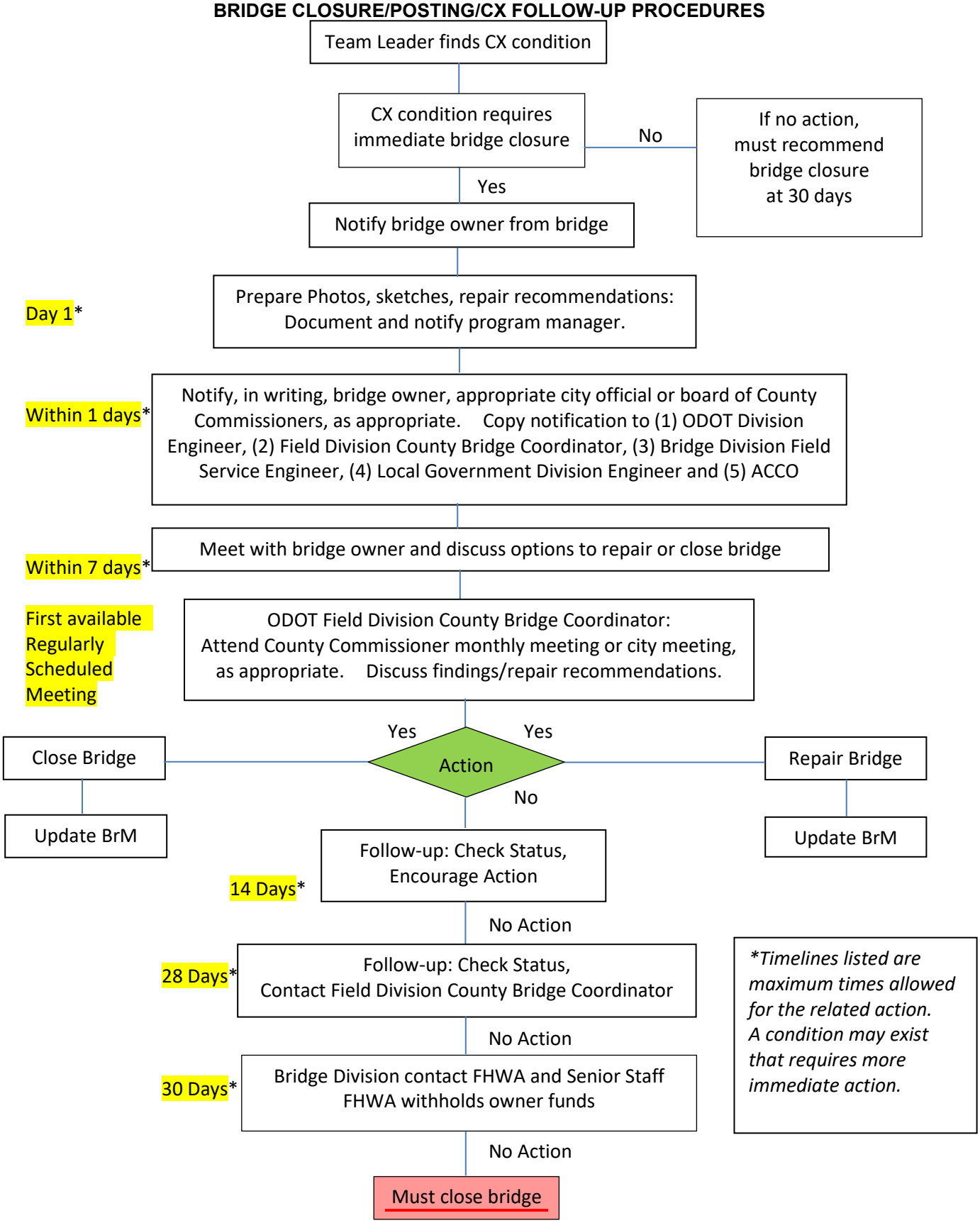
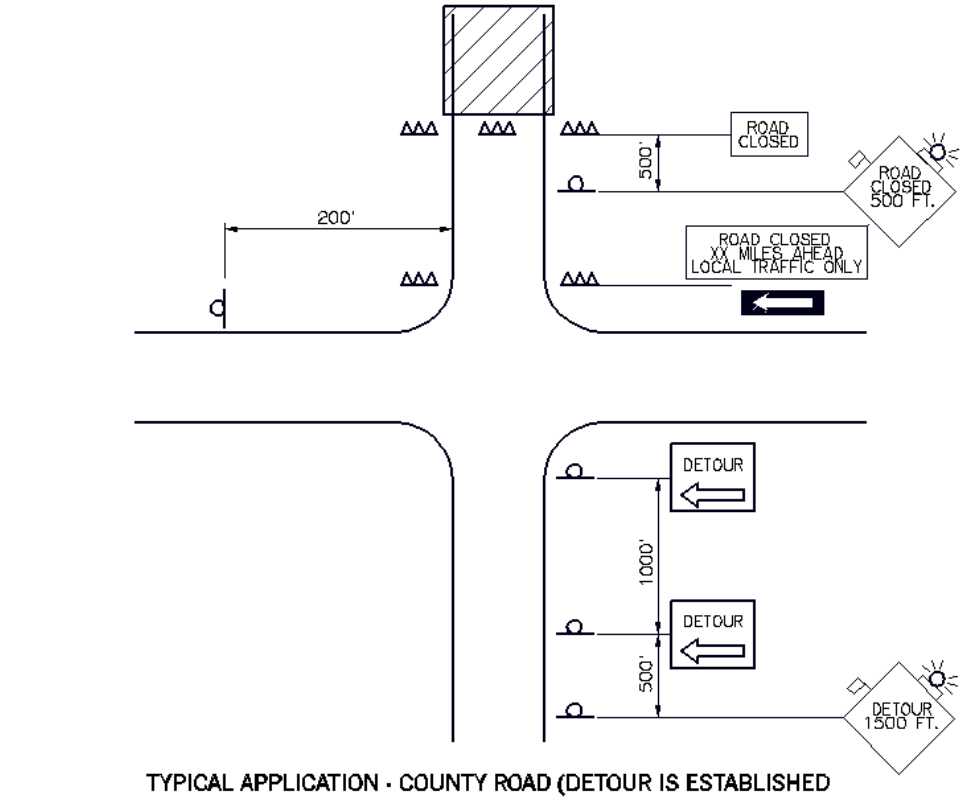
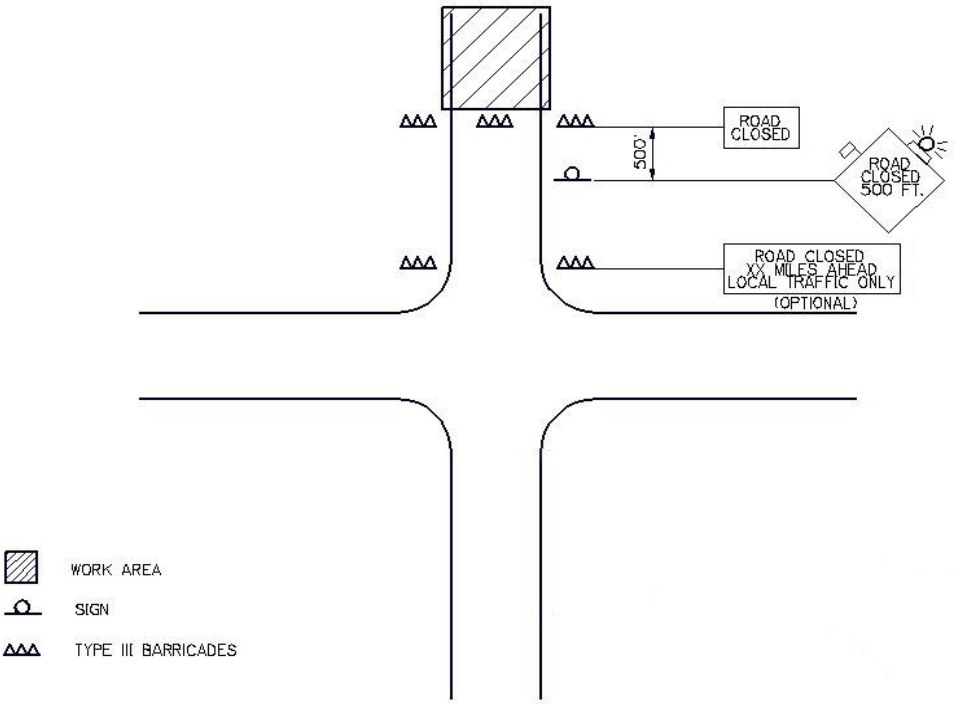


Figure I-2. Bridge Closure Procedure for Off-System Bridges



TYPICAL APPLICATION - COUNTY ROAD (DETOUR IS ESTABLISHED



TYPICAL APPLICATION - COUNTY ROAD (NO DETOUR IS ESTABLISHED

Figure I-3. County Road Signage for Closed Bridges

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APPENDIX J
GPS Bridge Locations

Accurate GPS latitude and longitude are necessary in order to identify the correct bridge location. This is important to inspection team leaders and Bridge Maintenance office personnel, in addition to external programs which use BrM data for bridge mapping and commercial truck routing.

Currently available commercial GPS tracking devices are not highly accurate. The better ones may have an accuracy of about 10 feet while the average unit may have an accuracy of between 15 and 30 feet. Therefore, the latitude and longitude recorded in BrM is not expected to be a precise measurement. It is possible that the latitude and longitude recorded in BrM will place you somewhere in a field near (or not so near) the bridge location. It is also possible that you will be taken to a bridge location that is not the correct bridge. These are the types of errors we are most interested in correcting.

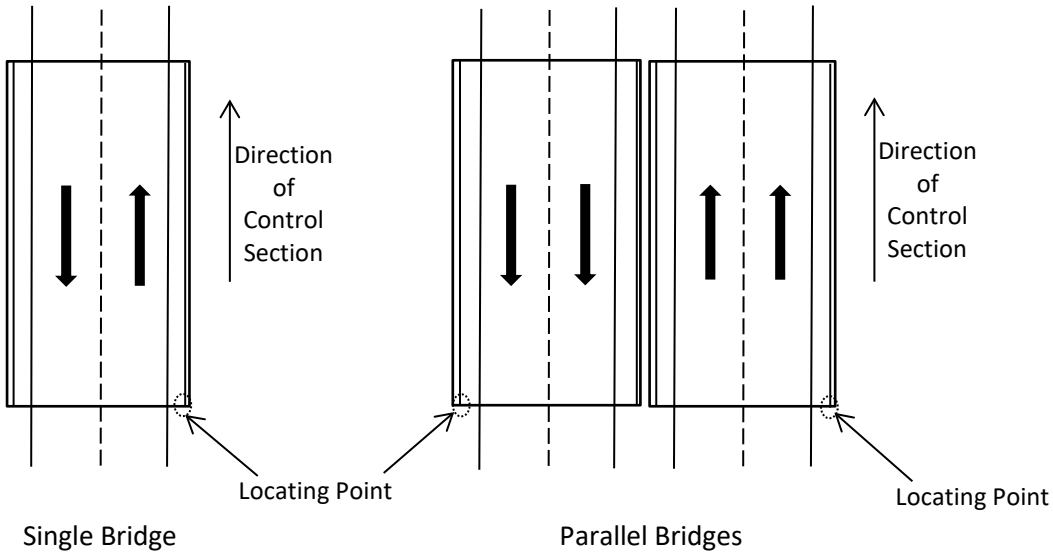
If the inspector records the latitude and longitude at a bridge site, using the location defined in this appendix, and finds a difference of 25 feet or more then the Bridge Maintenance office is interested in knowing your latitude and longitude measurements. Twenty-five feet correlates to approximately 0.3 seconds when the latitude and longitude is recorded in the degrees:minutes:seconds format.

The latitude and longitude entries in the BrM database are protected fields in order to protect the integrity of external programs such as OkiePROS, which use the BrM data. If it is found that the latitude and longitude entries in BrM are in error, do not enter the correct information in your submitted bridge inspection data. It will not pass through to the master oracle database. Instead send an email with the correct information to the Bridge Maintenance office.

The following directions should be followed whenever GPS latitude and longitude readings are taken at the bridge site.

1. <u>On-system bridges with primary route traffic on the structure</u> – Locate latitude and longitude using the beginning of the bridge along the primary inventory route in the direction of increasing mileage along the control section, on the inside edge of the top of the outside (right) curb for a single bridge and (in the case of parallel bridges) for the bridge located to the right of the parallel structure (refer to item 101).

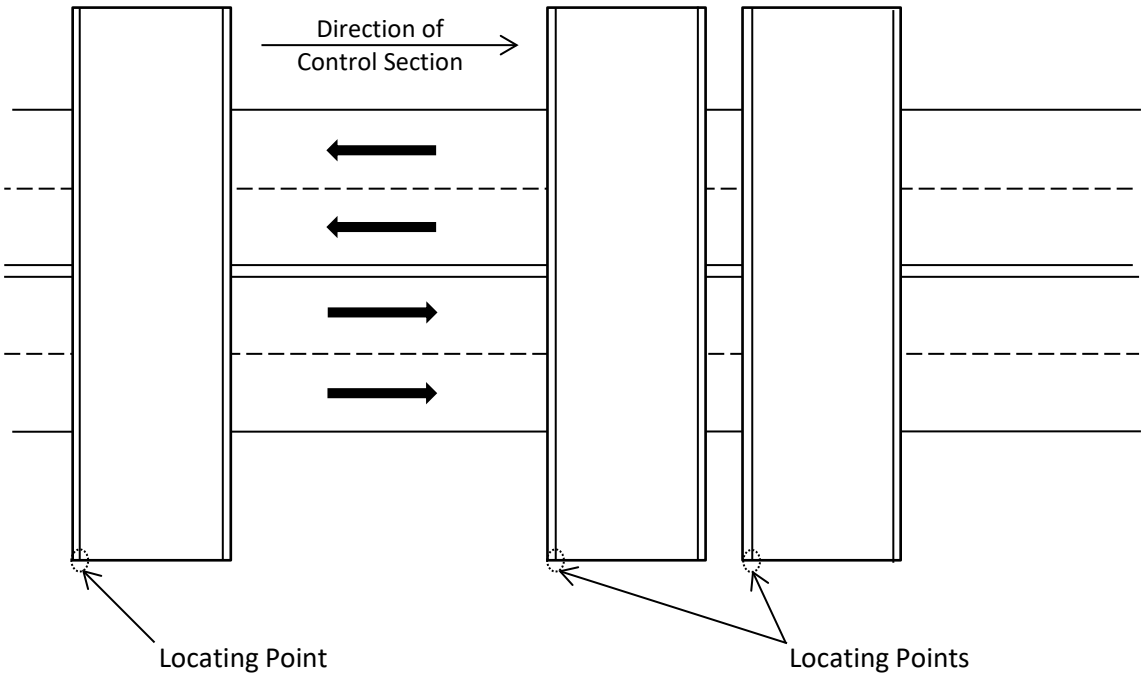
   For a bridge located to the left of a parallel bridge (refer to item 101), locate the latitude and longitude using the beginning of the bridge along the primary inventory route in the direction of increasing mileage along the control section, on the inside edge of the top of the outside (left) curb.



ON SYSTEM, PRIMARY ROUTE ON THE BRIDGE

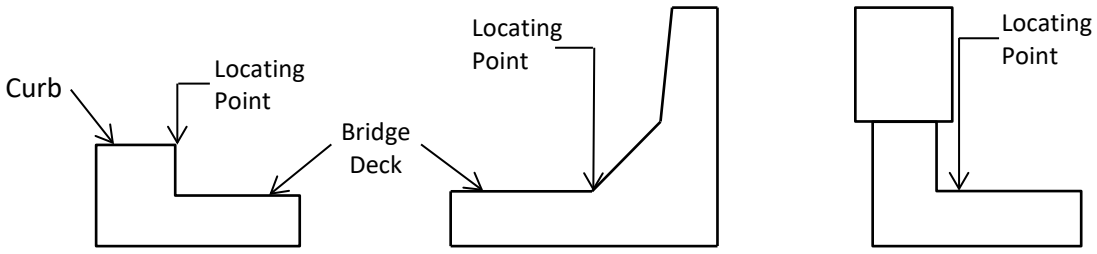
APPENDIX J
GPS Bridge Locations

On-system bridges with primary route traffic under the structure – Locate latitude and longitude using the beginning of the bridge along the primary route in the direction of increased mileage along the control section. Use this method regardless of the type of structure over the inventory route (roadway, railroad, pedestrian, utility, etc.).

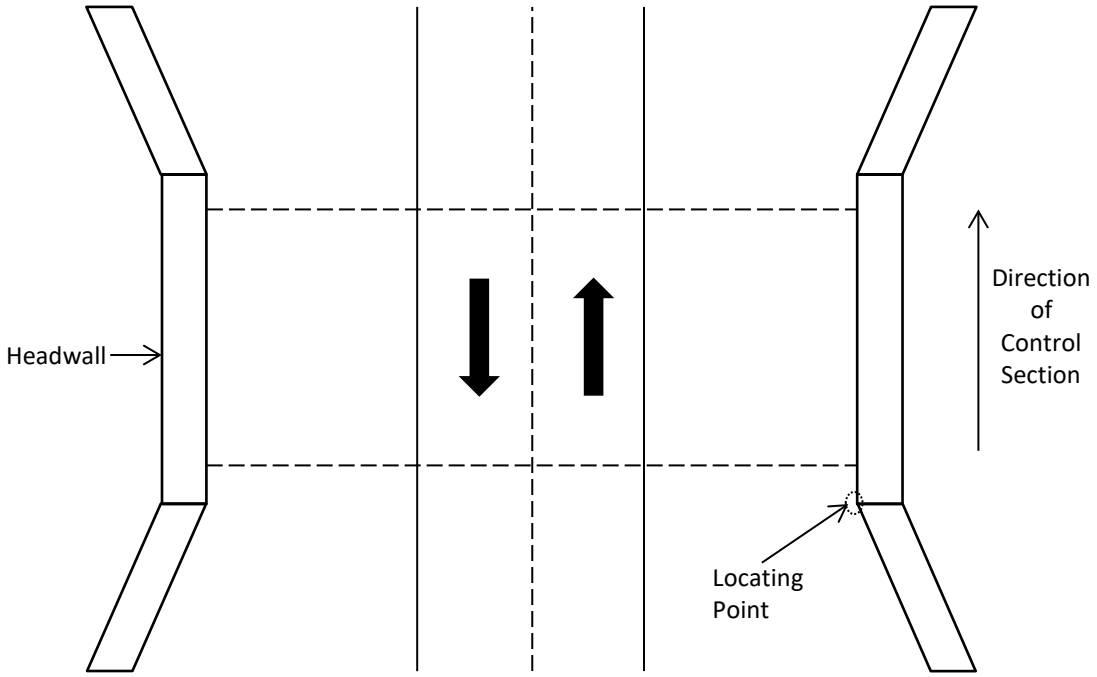


ON SYSTEM, PRIMARY ROUTE UNDER THE BRIDGE

2. Below are detailed sketches showing where the locating point is relative to the curb or traffic rail. In cases where there is no curb or traffic rail (e.g., on a timber plank deck), the locating point will be the extreme outside edge of the deck at the beginning of the bridge.



3. On-system box culverts under fill – locate latitude and longitude using the beginning of the bridge along the primary inventory route in the direction of increasing mileage along the control section, on a point at the beginning top of the right headwall. When there is a divided highway with separate boxes for the two directions of traffic, use the same convention as for parallel bridges described above.



4. Off-system bridges – locate latitude and longitude the same as for on-system bridges with the exception that the direction of travel for an off-system inventory route is always considered to be south-to-north or west-to-east.

APPENDIX J
GPS Bridge Locations

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