



Texas
Department
of Transportation

"Elements"

**FIELD INSPECTION AND CODING
MANUAL**

**FOR THE TxDOT BRIDGE
MANAGEMENT SYSTEM**

Rev. 9-14-2001

Introduction

The "Elements" Field Inspection and Coding Manual is designed to assist TxDOT bridge inspectors and Bridge Inspection coordinators with the collection of element-specific data on each bridge in Texas. This manual and element-specific data **SUPPLEMENTS BUT DOES NOT REPLACE** the Bridge Inspection Manual of Procedures and regular safety inspection of Texas Bridges.

Element-specific data is intended for use by engineers and managers within TxDOT to drive the decision support tools developed as part of a Bridge Management System. The Bridge Management System will help managers establish priorities for bridge replacements, rehabilitations and maintenance.

One of the major decision support tools chosen for implementation is called PONTIS. PONTIS is a large and economically sophisticated software package currently under development by AASHTO, and will become a requirement of TxDOT and FHWA. It uses elements, single components or parts of bridges that can be characterized by the type of member and its material, to do the following types of analysis: 1) Predict deterioration, 2) Predict costs for repair, rehabilitation or replacement, 3) Identify alternative programs based on level of service or other criteria, 4) Optimize expenditure based on user and agency costs, 5) Forecast budgets, and 6) Develop programs of improvements. While PONTIS is a powerful tool, its product will be no better than the quality of elemental data supplied by the bridge inspectors and coordinators in the field.

While the majority of the data collected as part of this effort will be used in the PONTIS software, additional items have been added to assist other management efforts.

Element specific data collection identifies the various parts of the bridge (**Elements**), the **Material Type** and measures or estimates the condition of that element (**Condition State**). The body of this manual will provide a more detailed explanation of the elements, condition states and other items that are a part of this supplementary inspection effort.

Initially, recording of elemental data will be on paper forms. As the effort progresses, we hope to incorporate laptop computers for field entry of both elemental data and National Bridge Inventory safety inspection information.

The qualification requirements for inspectors remains unchanged. Any questions about this coding guide should be directed to the Inspection Branch of the Bridge Division.

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TEXAS DEPARTMENT OF TRANSPORTATION

ELEMENT MATRIX 1/6

Decks/Slabs	UNITS	STEEL		P/S CONCRETE	REINFORCED CONCRETE	TIMBER	OTHER
		NO COATING	COATING				
Deck	EACH			# 40*	12	31	
Conventional Forming**	EACH				12.1**		
Permanent Metal Deck Forms (PMDF)**	EACH				12.2**		
P/S Concrete Panels (PCP)**	EACH				12.3		
Decks w/Coated Reinforcement	EACH			# 43*	26		
Conventional Forming**	EACH				26.1**		
Permanent Metal Deck Forms (PMDF)**	EACH				26.2**		
P/S Concrete Panels (PCP)**	EACH				26.3		

Slab Span	EACH			# 44*	38	# 54	
Slab Span w/Coated Reinforcement	EACH			# 45*	# 52		
Slab Span w/Edge Beams (FS)	EACH				56*		

- Notes:
1. # Indicates that there may be only a few bridges in Texas with this Element or Sub-element.
 2. ** Denotes a Sub-Element to a CoRe or Non-CoRe Element
 3. * Denotes a Non-CoRe Element
 4. If more than one type of forming system is used on the bridge due to widening, list the entire bridge as conventionally formed.
 5. If the existence of Coated Reinforcing cannot be established, list as element 12 or 38.
 6. If deck element is used as soffit - **Smart Flag 404** should also be used.

ELEMENT MATRIX 2/6

Wearing Surface	UNITS	STEEL		P/S CONCRETE	REINFORCED CONCRETE	TIMBER	OTHER
		NO COATING	COATING				
ACP Overlay	EACH						60*
2 Course Surface Treatment	EACH						61*
Rigid Concrete Overlay >1"	EACH						62*
Timber	EACH						63*

- Notes:
1. * Denotes a Non-CoRe Element
 2. If the presence of a two course surface treatment beneath the ACP cannot be determined, list as item 60.
 3. If the structure has either element 60 or 61, use the condition of the wearing surface as a guide in completing the condition of element 12. Smart Flag 404 should also be completed.

ELEMENT MATRIX 3/6

Superstructure	UNITS	STEEL		P/S CONCRETE	REINFORCED CONCRETE	TIMBER	OTHER
		NO COATING	COATING				
Box Beam or Girder (Closed Web)	LF	101	102	104	105		
Steel Plate Girder, Concrete T-Beam, or Rolled Beam (Open Girder)	LF	106	107	109	110	111	
Type A, B, C, 54", 72", IV, & VI Beams**	LF			109.1**			
T & Double T-Beams**	LF			109.2**			
Pan Form Girder **	LF				110.1**		
Stringer	LF	112	113	115	116	117	
Truss (through or part through - bottom chord)	LF	120	121				
Truss (through or part through - excluding bottom chord)	LF	125	126				
Deck Truss	LF	130	131				
Timber Truss/Arch	LF					# 135	
Arch	LF	# 140	# 141	# 143	144	156	# 145*
Floor Beam	LF	151	152	# 154	155		
Pin and Hanger Assemblies	EACH	160	161				
Secondary Members	EACH	163	164	165*	166*	167*	

- Notes:
1. # Indicates that there may be only a few bridges in Texas with this Element or Sub-element.
 2. ** Denotes a Sub-Element to a CoRe or Non-CoRe Element
 3. * Denotes a Non-CoRe Element

ELEMENT MATRIX 4/6

Substructure	UNITS	STEEL		P/S CONCRETE	REINFORCED CONCRETE	TIMBER	OTHER
		NO COATING	COATING				
Abutment	LF	213 *	214 *		215	216	217
Pier Bent	LF			212 *	210		211
Bent Cap	LF	230	231	233	234	235	
Column or Pile Extension	EACH	201	202	204	205	206	
Column (above ground/water)**	EACH			# 204.1 **	205.1 **		
Pile Extension (above ground/water)**	EACH			204.2 **	# 205.2 **		
Spread Footing (at ground line)*	EACH				# 218 *		
Pile Cap (at or above ground/water)*	EACH			222 *	221 *		
Tie Beams*	EACH	257 *	258 *	259 *	260 *	261 *	
Web Walls*	EACH				262 *		
Retaining Walls*	SF		263 *		264 *	265 *	
Wing Walls*	EACH		269 *		270 *	271 *	274 *
Rip Rap Slope Protection *	EACH				272 *		273 *
Submerged Pile Cap/Footing (Underwater Inspection ONLY)	EACH				220		
Submerged Piling or Drilled Shaft (Underwater Inspection ONLY)	EACH	225		226	227	228	
Pilings**	EACH				227.1 **		
Drilled Shaft**	EACH				227.2 **		
Culvert	LF	240	240		241	242	243

- Notes:
1. # Indicates that there may be only a few bridges in Texas with this Element or Sub-element.
 2. ** Denotes a Sub-Element to a CoRe or Non-CoRe Element
 3. * Denotes a Non-CoRe Element

ELEMENT MATRIX 5/6

Other Super/Substructure	UNITS	STEEL		P/S CONCRETE	REINFORCED CONCRETE	TIMBER	OTHER
		NO COATING	COATING				
Strip Seal Expansion Joint (SEJ)	LF						300
Pourable Joint Seal	LF						301
Compression Joint Seal (Armor Joint with PJS)	LF						302
Assembly (Modular) Joint Seal	LF						303
Open Expansion Joint	LF						304
Armored	LF						304.1
Finger	LF						304.2
Elastomeric Bearing (both fixed and expansion)	EACH						310
Moveable Bearing (Steel Rocker, Sliding, etc.)	EACH						311
Enclosed/Concealed Bearing (Roller Nests)	EACH						312
Fixed Bearing (Steel)	EACH						313
Pot Bearing	EACH						314
Disk Bearing	EACH						315
Approach Slab	EACH				321		
Bridge Rail	LF	330	330		331	332	333
Approach Rail*	LF	340 *	340 *		343 *	344 *	243 *

- Notes:
1. * Denotes a Non-CoRe Element

ELEMENT MATRIX 6/6

Smart Flags	Number
Steel - Fatigue	401
Pack Rust	402
Deck Cracking (Top Surface)	403
Under Side of Concrete Decks and Slabs	404
Settlement	405
Scour	406
Impact Damage - Reinforced Concrete Beams	407
Impact Damage - Prestressed Beams	408
Impact Damage - Steel Beams	409
Impact Damage - Rail	410
Impact Damage - Column	411
Exposed Pile or Drilled Shaft	412
Impact Damage - Truss	413
Drift	414

Decks/Slabs

Element Description Number	R/C Deck
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- 12 Reinforced Concrete Deck (EA)**
- 12.1 Conventionally Formed
- 12.2 Permanent Metal Deck Forms
- 12.3 Prestressed Concrete Panels

Smart Flag 404 should be used on conventionally formed and prestressed concrete panel decks. Also, Smart Flag 403 should be used if an overlay is not present.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface.

Condition State 2 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is 2% or less of the deck area.

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 2% but less than 10% of the total deck area.

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 10% but less than 25% of the total deck area.

Condition State 5 Repaired areas and/or spalls/delaminations exist. The combined area of distress is more than 25% of the total deck area.

Element Description Number	R/C Deck Coated
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- 26 Reinforced Concrete Deck with Coated Reinforcement (EA)**
- 26.1 Conventionally Formed
- 26.2 Permanent Metal Deck Forms
- 26.3 Prestressed Concrete Panels

Smart Flag 404 should be used on conventionally formed and prestressed concrete panel decks. Also, Smart Flag 403 should be used if an overlay is not present.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface.

Condition State 2 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is 2% or less of the deck area.

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 2% but less than 10% of the total deck area.

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 10% but less than 25% of the total deck area.

Condition State 5 Repaired areas and/or spalls/delaminations exist. The combined area of distress is more than 25% of the total deck area.

Element Description Number	Timber Deck
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31 Timber Deck (EA)

Condition State 1 Investigation indicates no decay. There may be cracks, splits and checks having no effect on strength or serviceability.

Condition State 2 Decay, insect infestation, splitting, cracking, or crushing may exist but none is sufficiently advanced to affect serviceability or strength.

Condition State 3 Decay, insect infestation, splitting, cracking, or crushing has produced loss of strength of the element but not of sufficient magnitude to affect the serviceability of the bridge.

Condition State 4 Advanced deterioration. Decay, insect infestation, splits, cracks, or crushing has produced loss of strength that affects the serviceability of the bridge.

Element Description Number	P/S Deck
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40 Prestressed Concrete Deck (EA)

43 Prestressed Concrete Deck with Coated Reinforcement (EA)

Smart Flag 404 should be used. Also, Smart Flag 403 should be used if an overlay is not present.

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without an effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present and there may be exposed reinforcing with no evidence of corrosion. there is no exposure of the prestressed system.

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure but no deterioration of the prestressed system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Condition State 4 Delaminations, spalls, and corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestressed system (manifested by loss of bond, broken strands or wire, failed anchorages, etc.). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Element Description Number	R/C Slab Span
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38 Reinforced Concrete Slab Span (EA)

52 Reinforced Concrete Slab Span with Coated Reinforcement (EA)

Note: Because of their design concept, a deck element is not used for slab spans. Smart Flag 404 should be used. Also, Smart Flag 403 should be used if an overlay is not present.

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface.

Condition State 2 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is 2% or less of the deck area.

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 2% but less than 10% of the total deck area.

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 10% but less than 25% of the total deck area.

Condition State 5 Repaired areas and/or spalls/delaminations exist. The combined area of distress is more than 25% of the total deck area.

Element Description Number	P/S Slab Span
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44 Prestressed Concrete Slab Span (EA)

45 Prestressed Concrete Slab Span with Coated Reinforcement (EA)

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without an effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present and there may be exposed reinforcing with no evidence of corrosion. There is no exposure of the prestressed system.

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure but no deterioration of the prestressed system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.

Condition State 4 Delaminations, spalls, and corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestressed system (manifested by loss of bond, broken strands or wire, failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Element Description Number	Timber Span
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54 Timber Slab Span (EA)

Condition State 1 Investigation indicates no decay. There may be cracks, splits, and checks having no effect on strength of serviceability.

Condition State 2 Decay, insect infestation, splitting, cracking, or crushing may exist but none is sufficiently advanced to affect serviceability or strength.

Condition State 3 Decay, insect infestation, splitting cracking, or crushing has produced a loss of strength of the element but not of sufficient magnitude to affect the serviceability of the bridge.

Condition State 4 Advanced deterioration. Decay, insect infestation, splits, cracks, or crushing has produced loss of strength that affects the serviceability of the bridge.

Element Description Number	R/C Slab Span w/Edge Beams (FS)
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56 Reinforced Concrete Slab Span with Edge Beams Type FS (EA)

Condition State 1 The surface of the deck has no repaired areas and there are no spalls/delaminations in the deck surface.

Condition State 2 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is 2% or less of the deck area.

Condition State 3 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more than 2% but less than 10% of the total deck area.

Condition State 4 Repaired areas and/or spalls/delaminations exist in the deck surface. The combined area of distress is more that 10% but less than 25% of the total deck area.

Condition State 5 Repaired areas and/or spalls/delaminations exist. The combined area of distress is more than 25% of the total deck area.

Wearing Surfaces

Element Description Number	Wearing Surface
60	ACP Overlay (EA)
61	Two-Course Surface Treatment (EA)

Condition State 1 The wearing surface has no repaired areas and there is no noticeable wear or material loss.

Condition State 2 Wearing away of the aggregate binder has started but is not severe. There are some minor cracks in the surface and some small patches have been made.

Condition State 3 Surface aggregate and/or binder has worn away and the surface texture is becoming rough and pitted. Cracks are beginning to form articulated pieces and significant patches have been made.

Condition State 4 Surface is rough with loose particles existing. Cracks have formed articulated pieces with spalled edges. Patches have been patched.

Element Description Number	Wearing Surface Concrete
62	Rigid Concrete Overlay >1" (EA)

Condition State 1 The wearing surface has no repaired areas and there are no spalls/delaminations.

Condition State 2 Repaired areas and/or spalls/delaminations exist in the wearing surface but do not penetrate into the deck of slab. The combined area of distress is 2% or less of the wearing surface area.

Condition State 3 Repaired areas and/or spalls/delaminations exist in the wearing surface. The combined area of distress is more than 2% but less than 10% of the total surface area.

Condition State 4 Repaired areas and/or spalls/delaminations exist in the wearing surface, areas and/or spalls/delaminations exist in the wearing surface.

Condition State 5 Repaired areas and/or spalls/delaminations exist in the wearing surface, some penetrating into the deck or slab. The combined area of distress is more than 10% but less than 25% of the total surface area.

Element Description Number	Wearing Surface Timber
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63 Timber Wearing Surface (EA)

Condition State 1 Investigation indicates no decay. There may be superficial cracks, splits, and checks having no effect on strength or serviceability.

Condition State 2 Decay, insect infestation/marine borer infestation, splitting, cracking, checking, or crushing may exist but none is sufficiently advanced to affect the serviceability of the element.

Condition State 3 Decay, insect infestation, splitting, cracking, or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.

Condition State 4 Advanced deterioration. Decay, insect infestation, splits, cracks, or crushing has produced loss of strength that affects the serviceability of the bridge.

Superstructure

Element Description Number	Superstructure Unpainted Steel
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101 Box Beam or Box Girder - Unpainted Steel (LF)

106 Steel Girder, Riveted or Rolled Beam - Unpainted Steel (LF)

112 Stringer - Unpainted Steel (LF)

120 Bottom Chord of Through Truss (or Part Through) - Unpainted Steel (LF)

125 Through Truss Excluding Bottom Chord - Unpainted Steel (LF)

130 Deck Truss - Unpainted Steel (LF)

140 Arch - Unpainted Steel (LF)

151 Floor Beam - Unpainted Steel (LF)

163 Secondary Members - Unpainted Steel (EA)

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coating uniformly and remains in excellent condition.

Condition State 2 Surface rust, surface pitting, has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown.

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black.

Condition State 4 Corrosion is advanced. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Element Description Number	Superstructure Painted Steel
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- 102 Box Beam or Box Girder - Painted Steel (LF)**
- 107 Steel Girder, Riveted or Rolled Beam - Painted Steel (LF)**
- 113 Stringer - Painted Steel (LF)**
- 121 Bottom Chord of Through Truss (or Part Through) - Painted Steel (LF)**
- 126 Through Truss Excluding Bottom Chord - Painted Steel (LF)**
- 131 Deck Truss - Painted Steel (LF)**
- 141 Arch - Painted Steel (LF)**
- 152 Floor Beam - Painted Steel (LF)**
- 164 Secondary Members - Painted Steel (EA)**

Condition State 1 There is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

Condition State 2 There is little or no active corrosion. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

Condition State 3 Surface or freckled rust has formed or is forming. The paint system is no longer effective. There may be exposed metal but there is no active corrosion which is causing loss of section.

Condition State 4 The paint system has failed. Surface pitting may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

Condition State 5 Corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Element Description Number	Superstructure P/S
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- 104** **Box Beam or Box Girder - Prestressed Concrete (LF)**
- 109** **Open Girder - Prestressed Concrete (LF)**
 - 109.1 Types A, B, C, 54", 72", IV and VI Beams
 - 109.2 T- and Double T-Beams
- 115** **Stringer - Prestressed Concrete (LF)**
- 143** **Arch - Prestressed Concrete (LF)**
- 154** **Floor Beam - Prestressed Concrete (LF)**
- 165** **Secondary Members - Prestressed Concrete (EA)**

Note: A Deck element is not required for element 104 unless there is separation between box beams.

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present and there may be exposed reinforcing with no evidence of corrosion. There is no exposure of the prestress system.

Condition State 3 Some delaminations and/or spalls may be present. There may be minor exposure but no deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is incidental and does not significantly affect strength and/or serviceability of either the element or the bridge.

Condition State 4 Delaminations, spalls and corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands of wire, failed anchorages, etc.). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Element Description Number	Superstructure R/C
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- 105 Box Beam or Box Girder - Reinforced Concrete (LF)**
- 110 Concrete T-Beam - Reinforced Concrete (LF)**
110.1 Pan Form Girder
- 116 Stringer - Reinforced Concrete (LF)**
- 144 Arch - Reinforced Concrete (LF)**
- 155 Floor Beam - Reinforced Concrete (LF)**
- 166 Secondary Members - Reinforced Concrete (EA)**

Explanatory Note: Texas Pan Form Girders have arched surfaces between the stems of the beams. They typically are built in 30- and 40-foot span lengths. Because of their design concept, a deck element is not required. Pan Form Girders usually have longitudinal cracks at the top of the arch. This is thought to be a product of the forming system and shrinkage during the casting operation. If these cracks are fine and not leaking, it need not be used as reason to lower the condition state.

Each girder stem is considered for quantities (see example 1).

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present but there is no exposed reinforcing or surface evidence of rebar corrosion.

Condition State 3 Some delaminations and/or spalls may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect strength and/or serviceability of either the element or the bridge.

Condition State 4 Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Element Description Number	Superstructure Timber
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- 111 Girder - Timber (LF)**
- 117 Stringer - Timber (LF)**
- 135 Truss/Arch - Timber (LF)**
- 156 Floor Beam - Timber (LF)**
- 167 Secondary Members - Timber (EA)**

Condition State 1 Investigation indicates no decay. There may be superficial cracks, splits and checks having no effect on strength.

Condition State 2 Decay, insect infestation/marine borer infestation, splitting, cracking, checking, or crushing may exist but none is sufficiently advanced to effect serviceability of the element.

Condition State 3 Decay, insect infestation, splitting, cracking, or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.

Condition State 4 Advanced deterioration. Decay, insect infestation, splits, cracks, or crushing has produced loss of strength that affects the serviceability of the bridge.

Element Description Number	Arch - Other
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- 145 Arch - Other (LF)**

Condition State 1 There is little or no deterioration. Surface defects only are in evidence.

Condition State 2 There may be minor deterioration and cracking. Mortar in joints may show minor deterioration.

Condition State 3 Moderate to major deterioration and cracking. Major deterioration of joints.

Condition State 4 Major deterioration, splitting, or cracking of materials may be affecting the structural capacity of the element.

Element Description
Number

Pin & Hanger Unpainted Steel

160 Pin & Hanger Assembly - Unpainted Steel (EA)

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coating uniformly and remains in excellent condition.

Condition State 2 Surface rust, surface pitting, has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits.

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis.

Condition State 4 Corrosion is advanced. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Element Description
Number

Pin & Hanger Painted Steel

161 Pin & Hanger Assembly - Painted Steel (EA)

Condition State 1 There is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

Condition State 2 There is little or no active corrosion. The paint system may be chalking, peeling, curling, or showing other early evidence of paint system distress but there is no exposure of metal.

Condition State 3 Surface or freckled rust has formed or is forming. The paint system no longer effective. There may be exposed metal but there is no loss of section.

Condition State 4 The paint system has failed. Surface pitting may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

Condition State 5 Corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Substructure

Element Description Number	Substructure Unpainted Steel
201	Pile Extension - Unpainted Steel (EA)
225	Submerged Piling - Unpainted Steel (EA)
230	Bent Cap - Unpainted Steel (LF)
257	Tie Beam - Unpainted Steel (EA)

Condition State 1 There is little or no corrosion of the unpainted steel. The weathering steel is coating uniformly and remains in excellent condition.

Condition State 2 Surface rust, surface pitting, has formed or is forming on the unpainted steel. The weathering steel has not corroded beyond design limits. Weathering steel color is yellow orange to light brown.

Condition State 3 Steel has measurable section loss due to corrosion but does not warrant structural analysis. Weathering steel is dark brown or black.

Condition State 4 Corrosion is advanced. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Element Description Number	Substructure Painted Steel
202	Pile Extension - Painted Steel (EA)
214	Abutment - Painted Steel (LF)
231	Bent Cap - Painted Steel (LF)
258	Tie Beam - Painted Steel (EA)

Condition State 1 There is no evidence of active corrosion and the paint system is sound and functioning as intended to protect the metal surface.

Condition State 2 There is little or no active corrosion. The paint system may be chalking, peeling, curling or showing other early evidence of paint system distress but there is no exposure of metal.

Condition State 3 Surface or freckled rust has formed or is forming. The paint system is no longer effective. There may be exposed metal but there is no active corrosion which is causing loss of section.

Condition State 4 The paint system has failed. Surface pitting may be present but any section loss due to active corrosion does not yet warrant structural analysis of either the element or the bridge.

Condition State 5 Corrosion has caused section loss and is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Element Description Number	Substructure P/S
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- 204 Column or Pile Extension - Prestressed Concrete (EA)**
 - 204.1 Column or Pile Extension - Prestressed Concrete -- Column
 - 204.2 Column or Pile Extension - Prestressed Concrete -- Pile Extension
- 212 Pier Bent - Prestressed Concrete (LF)**
- 222 Pile Cap - Prestressed Concrete (EA)**
- 226 Submerged Piling - Prestressed Concrete (EA)**
- 233 Bent Cap - Prestressed Concrete (LF)**
- 259 Tie Beam - Prestressed Concrete (EA)**

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present but there is no exposed reinforcing or surface evidence of rebar corrosion.

Condition State 3 Some delaminations and/or spalls may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect strength and/or serviceability of either the element or the bridge.

Condition State 4 Delaminations, spalls and corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands of wire, failed anchorages, etc.). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Element Description Number	Substructure R/C
205	Column or Pile Extension - Reinforced Concrete (EA)
205.1	Column or Pile Extension - Reinforced Concrete -- Column
205.2	Column or Pile Extension - Reinforced Concrete -- Pile Extension
210	Pier Bent - Reinforced Concrete (LF)
215	Abutment - Reinforced Concrete (LF)
218	Spread Footing - Reinforced Concrete (EA)
220	Submerged Pile Cap/Footing - Reinforced Concrete (EA)
221	Pile Cap - Reinforced Concrete (EA)
227	Submerged Piling/Drilled Shaft - Reinforced Concrete (EA)
227.1	Submerged Piling/Drilled Shaft - Reinforced Concrete -- Piling
227.2	Submerged Piling/Drilled Shaft - Reinforced Concrete -- Drilled Shaft
234	Bent Cap - Reinforced Concrete (LF)
260	Tie Beam - Reinforced Concrete (EA)
262	Web Wall - Reinforced Concrete (EA)
264	Retaining Wall - Reinforced Concrete (SF)
270	Wing Wall - Reinforced Concrete (EA)

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present but there is no exposed reinforcing or surface evidence of rebar corrosion.

Condition State 3 Some delaminations and/or spalls may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect strength and/or serviceability of either the element or the bridge.

Condition State 4 Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

Element Description Number	Substructure Timber
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- 206 Pile Extension - Timber (EA)**
- 216 Abutment - Timber (LF)**
- 228 Submerged Piling - Timber (EA)**
- 235 Bent Cap - Timber (LF)**
- 261 Tie Beam - Timber (EA)**
- 265 Retaining Wall - Timber (SF)**
- 271 Wing Wall - Timber (EA)**

Condition State 1 Investigation indicates no decay. There may be superficial cracks, splits and checks having no effect on strength or serviceability.

Condition State 2 Decay, insect infestation/marine borer infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability of the element.

Condition State 3 Decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.

Condition State 4 Advanced deterioration. Decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.

Element Description Number	Substructure Other
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- 211 Pier Bent - Other (LF)**
- 217 Abutment - Other (LF)**
- 274 Wing Walls - Other (EA)**

Condition State 1 There is little or no deterioration. Surface defects only are in evidence.

Condition State 2 There may be minor deterioration, cracking, and weathering. Mortar in joints may show minor deterioration.

Condition State 3 Moderate to major deterioration and cracking. Major deterioration of joints.

Condition State 4 Major deterioration, splitting, or cracking of materials may be affecting the structural capacity of the element.

Element Description
Number

Abutment Unpainted Steel

213 Abutment - Unpainted Steel (LF)

Condition State 1 There is little or no corrosion of the unpainted steel.

Condition State 2 Surface rust has formed or is forming.

Condition State 3 Surface pitting may be present but any section loss is incidental and does not affect the strength or serviceability of either the element or the bridge.

Condition State 4 Corrosion is advanced. Section loss is sufficient to warrant structural analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.

Element Description
Number

Culvert - Steel

240 Culvert - Steel (LF)

Note: Measure culverts in linear feet along the length of each barrel.

Condition State 1 The element shows little or no deterioration. Some discoloration or surface corrosion may exist but there is no metal pitting. If a protective coating is present it is sound and functioning as intended to protect the element.

Condition State 2 There may be minor to moderate corrosion and pitting, especially at the barrel invert. Little or no distortion exists. If a protective coating is present it has minor areas of deterioration.

Condition State 3 Any protective coating present has failed. Significant corrosion, deep pitting, or some holes in the invert may exist. Significant scour or erosion may be affecting structural integrity. Minor to moderate distortion and deflection may exist. There is little or no roadway settlement.

Condition State 4 Major corrosion, extreme pitting, or holes in the barrel may exist. Major distortion, deflection, or settlement may be evident. Minor to major roadway settlement may be evident.

Element Description
Number

Culvert - R/C

241 Culvert - Reinforced Concrete (LF)

Note: Measure culverts in linear feet along the length of each barrel.

Condition State 1 Superficial cracks and spalls may be present, but there is no exposed reinforcing or evidence of rebar corrosion. There is little or no deterioration or separation of joints.

Condition State 2 Deterioration, minor chloride contamination, minor cracking, and/or leaching may have begun. There may be deterioration and separation of joints.

Condition State 3 There may be moderate to major deterioration, extensive cracking and/or leaching and large areas of spalls. Minor to moderate distortion, settlement, or misalignment may have occurred. There may be considerable deterioration and separation of joints and/or minor roadway settlement.

Condition State 4 Major deterioration, spalling, cracking, major distortion, deflection settlement, or misalignment of the barrel may be in evidence. Major separation of joints may have occurred. Holes may exist in floors and walls. Settlement of roadway may have occurred.

Element Description
Number

Culvert - Timber

242 Culvert - Timber (LF)

Note: Measure culverts in linear feet along the length of each barrel.

Condition State 1 The timber and fasteners are in sound condition.

Condition State 2 There may be minor decay and weathering. Corrosion at fasteners and connections may have begun. There is little or no distortion and/or deflection.

Condition State 3 There may be significant decay, weathering, and warped or broken timbers. Significant decay and corrosion at fasteners and connections may be evident. Minor to moderate distortion of the culvert may exist. There is little or no roadway settlement.

Condition State 4 There may be major decay and many warped, broken, or missing timbers. There is major decay and corrosion at fasteners and connections. Major distortion or deflection of the culvert may exist. There may be minor to major roadway settlement.

Element Description Number	Culvert - Other
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243 Culvert - Other (LF)

Note: Measure culverts in linear feet along the length of each barrel.

Condition State 1 There is little or no deterioration. Surface defects only are in evidence. There are no scour or misalignment problems.

Condition State 2 There may be minor deterioration, cracking and misalignment.

Condition State 3 Moderate to major deterioration and cracking and/or minor to moderate distortion or deflection has occurred. There is little or no roadway settlement.

Condition State 4 Major distortion, deflection, settlement, or misalignment and/or major deterioration affecting structural integrity may have occurred. Settlement of roadway has occurred.

Element Description Number	Metal Wall
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263 Retaining Wall - Metal (SF)

269 Wing Wall - Metal (EA)

Condition State 1 There is little or no corrosion of the unpainted metal. If a protective coating is present it is sound and functioning as intended to protect the element.

Condition State 2 Surface or freckled rust has formed or is forming on the unpainted metal. If a protective coating is present it has minor areas of deterioration.

Condition State 3 Any protective coating present has failed. Surface pitting may be present but any section loss due to active corrosion is measurable and does not affect the strength or serviceability of the element.

Condition State 4 Corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element.

Element Description
Number

Rip Rap - R/C

272 Rip Rap Slope Protection - Reinforced Concrete (EA)

Condition State 1 The rip rap has not settled and shows no sign of deterioration other than superficial surface cracks.

Condition State 2 Minor cracking, spalls may present but they do not affect the ability of the rip rap to protect the slope. Minor erosion may be present at toe and edges. No settlement is evident.

Condition State 3 Cracks may extend completely through rip rap cross-section. Spalls may be heavy but they do not affect the structural integrity of the slab. Minor settlement may be occurring at abutment or edges. Significant erosion is occurring on the bridge.

Condition State 4 The rip rap is broken with large open joints. Significant settlement is occurring and there are some voids behind the rip rap. Erosion has undermined portion of the slope.

Element Description
Number

Rip Rap - Other

273 Rip Rap Slope Protection - Other (EA)

Condition State 1 The rip rap has not settled and shows no sign of significant deterioration.

Condition State 2 Minor erosion and loss of material may be present at toe and edges. No settlement is evident.

Condition State 3 Minor settlement may be occurring at abutment or edges. Significant erosion is occurring. Loss of material has become significant.

Condition State 4 Significant settlement is occurring and there are some voids behind the rip rap. Erosion has undermined portion of the slope. Large areas of material are missing.

Other Super/Substructure

Element Description
Number

SEJ

300 Strip Seal Expansion Joint (LF)

Condition State 1 There is no leakage at any point along the joint. Gland is secure and has no defects. Debris in joint is not causing any problems.

Condition State 2 Minor leakage due to punctured or ripped joint, or due to gland pulled out of extrusion. Significant debris in joint.

Condition State 3 Major deterioration of gland, concrete spalled at joint, major leakage along entire joint.

Element Description
Number

PJS

301 Pourable Joint Seal (LF)

Condition State 1 The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound.

Condition State 2 Minor adhesion and/or cohesion failures may be present. Minor leakage may show underneath. Joint may be slightly impacted with debris. Minor spalls in deck and/or headers may be present adjacent to joint.

Condition State 3 Adhesion and/or cohesion failures are large enough to cause leakage problems. Joint may be heavily impacted with debris and/or stones. Adjacent deck may be spalled.

Element Description
Number

CJS

302 Compression Joint Seal (LF)

Condition State 1 The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound.

Condition State 2 There may be small adhesion failures. The seal may show signs of abrasion or minor tearing. Minor spalls in the deck and/or headers may be present.

Condition State 3 Adhesion failures may be prevalent with the seal possibly showing signs of failure from abrasion or tearing. Significant spalls may be present in the deck and/or headers adjacent to the seal.

Element Description
Number

Assembly J/S

303 Assembly Joint Seal (LF)

Condition State 1 The element shows minimal deterioration. The anchors are tight. There are no broken welds or fingers. The adjacent deck is sound. The paint system, if it is present, is sound and functioning as intended to protect the metal.

Condition State 2 The paint system, if present, may show some corrosion with slight pitting. There may be minor weld cracking. The adjacent deck may show signs of anchors loosening. There may be minor spalling of the anchorage concrete.

Condition State 3 Corrosion is advanced. The assembly may be loose because of anchorage failure. There may be deck spalling adjacent to the assembly. Broken fingers may be prevalent.

Element Description
Number

Open Joint

304 Open Expansion Joint (LF)

304.1 Open Expansion Joint - Armored

304.2 Open Expansion Joint - Finger

Condition State 1 The element shows minimal deterioration. Joint armor, if present, is secure. There are no significant joint spalls.

Condition State 2 There may be deck cracking indicating armor anchor loosening. Spalling at joint edges or adjacent to armor may have begun. There may be corrosion on joint armor.

Condition State 3 Advanced corrosion of joint armor. There may be large spalls at the joint edges or adjacent to armor. Armor anchors are loose.

Element Description
Number

Elastometric Bearing

310 Elastometric Bearing (EA)

Condition State 1 The element shows little or no deterioration. Shear deformations are correct for existing temperatures.

Condition State 2 Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Strength and/or serviceability are not affected.

Condition State 3 Advanced corrosion of joint armor. There may be large spalls at the joint edges or adjacent to armor. Armor anchors are loose.

Element Description
Number

Movable Bearing

311 Movable Bearing (Roller, Rocker, Sliding, Etc.) (EA)

Condition State 1 The element shows little or no deterioration. If a paint system is present, it is sound and functioning as intended to protect the metal. The bearing has minimal debris and corrosion. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.

Condition State 2 The paint system, if present, may show some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking in the supporting concrete. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable.

Condition State 3 Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The lubrication system, if any, may have failed.

Element Description
Number

Enclosed Bearing

312 Enclosed/Concealed Bearing or Bearing System (EA)

Condition State 1 The element shows little or no deterioration. There are no vertical or horizontal offsets. There is no cracking of support members. The supported member is stable under traffic.

Condition State 2 Both vertical and horizontal offsets are within the capability of the bearings and are not yet significant. The supported member may exhibit minimal vertical movement under traffic. Cracking of support members is not yet significant. There may be insignificant reduction of bearing due to superstructure shortening.

Condition State 3 Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Cracking of the support members may be significant. There may be significant reduction of bearing due to superstructure shortening.

Element Description
Number

Fixed Bearing

313 Fixed Bearing (EA)

Condition State 1 The element shows little or no deterioration. If a paint system is present, it is sound and functioning as intended to protect the metal. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.

Condition State 2 The paint system, if present, may show some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking in the supporting concrete.

Condition State 3 Corrosion is advanced. there may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Shear keys may have failed. The lubrication system, if any, may have failed.

Element Description
Number

Pot Bearing

314 Pot Bearing (EA)

Condition State 1 The element shows minimal deterioration. The paint or other anti-corrosion system is sound and functioning as intended to protect the metal. The bearing has minimal debris and corrosion. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.

Condition State 2 The anti-corrosion system may show some corrosion with minor pitting. Debris buildup is affecting bearing movement. Bearing alignment and load carrying capacity is still tolerable.

Condition State 3 Corrosion is advanced. bearing alignment and load carrying Capacity may be beyond limits. Shear keys and the lubrication system, if any, may have failed. Elastometer may be actively extruding from the device.

Element Description
Number

Disk Bearing

315 Disk Bearing (EA)

Condition State 1 The element shows minimal deterioration. The paint or other anti-corrosion system is sound and functioning as intended to protect the metal. The bearing has minimal debris and corrosion. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.

Condition State 2 The anti-corrosion system may show some corrosion with minor pitting. Debris buildup is affecting bearing movement. Bearing alignment and load carrying capacity is still tolerable.

Condition State 3 Corrosion is advanced. Bearing alignment and load carrying capacity may be beyond limits. Shear keys and the lubrication system, if any, may have failed.

Element Description Number	Approach Slab
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321 Approach Slab - Reinforced Concrete (EA)

Condition State 1 The slab has not settled and shows no sign of deterioration other than superficial surface cracks.

Condition State 2 Minor cracking, spalls may be present but they do not affect the ability of the slab to carry traffic. Settlement may be occurring which increases the traffic impact on the bridge.

Condition State 3 Cracks may extend completely through the slab cross-section, but the slab does not act as if it is broken. Spalls may be heavy but they do not affect the structural integrity of the slab. Settlement may be occurring which increases the traffic impact on the bridge.

Condition State 4 The slab is broken or rocks under traffic loads. Settlement is excessive and cannot be corrected without increasing the size of the slab.

Element Description Number	Rail - Metal
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330 Bridge Rail - Metal (LF)

340 Approach Rail - Metal (LF)

Condition State 1 There is little or no corrosion of the metal. If a protective coating is present it is sound and functioning as intended to protect the element.

Condition State 2 Surface or freckled rust has formed or is forming on the metal. If protective coating is present it has minor areas of deterioration.

Condition State 3 Any protective coating present has failed. Surface pitting may be present but any section loss due to active corrosion is measurable and does not affect the strength or serviceability of the element.

Condition State 4 Corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element.

Element Description
Number

Rail - R/C

331 Bridge Rail - Reinforced Concrete (LF)

343 Approach Rail - Reinforced Concrete (LF)

Condition State 1 The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability.

Condition State 2 Minor cracks and spalls may be present. Reinforcing may be exposed with some corrosion. Strength and/or serviceability are not affected.

Condition State 3 Advanced deterioration. Corrosion of reinforcement and/or loss of section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element.

Element Description
Number

Rail - Timber

332 Bridge Rail - Timber (LF)

344 Approach Rail - Timber (LF)

Condition State 1 There is no decay. There may be minor cracks, splits and/or checks.

Condition State 2 There may be decay with or without splitting, cracking, checking, or crushing, but none is sufficiently advanced to affect serviceability.

Condition State 3 Advanced deterioration. Decay, splits, cracks, or crushing has produced loss of strength that may affect the serviceability of the element.

Element Description
Number

Rail - Other

333 Bridge Rail - Other (LF)

345 Approach Rail - Other (LF)

Condition State 1 The element shows no signs of deterioration. There may be minor cracking, corrosion and/or other minor deterioration having no affect on strength or serviceability.

Condition State 2 Minor cracking, spalls, decay of timber portions or corrosion of metal may be present.

Condition State 3 Advanced deterioration. Corrosion, decay, or loss of section is sufficient to warrant analysis to ascertain the impact on the serviceability or strength of the element.

Smart Flags

Element Description
Number

Steel - Fatigue

401 Steel - Fatigue

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 which 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).

Condition State 3 Fatigue damage exists which warrants analysis of the element to ascertain the serviceability of the element or the bridge.

Element Description
Number

Pack Rust

402 Pack Rust

Condition State 1 The connection is showing signs of rusting between plates. Seams of the connections 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.

Element Description
Number

Deck Cracking

403 Deck Cracking

Condition State 1 The surface of the deck is cracked, but the cracks are either filled/sealed or insignificant in size. The combined area of distress is less than 2% of the total deck area.

Condition State 2 Unsealed cracks exist in the deck which are of moderate size. The combined area of distress is more than 2% but less than 10% of the total deck area.

Condition State 3 Unsealed cracks exist in the deck which are of moderate size. The combined area of distress is more than 10% but less than 25% of the total deck area.

Condition State 4 Unsealed cracks exist in the deck which are of severe size. The combined area of distress is more than 25% of the total deck area.

Element Description Number	Soffit - Underside of Concrete Decks and Slabs
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404 Soffit - Underside of Concrete Decks and Slabs

Condition State 1 The under-surface of the deck or slab has no symptoms of distress. Any cracking that is present is only superficial.

Condition State 2 The under-surface of the deck or slab shows no evidence that active corrosion is occurring in the deck (there is no rust staining or spalling which could be attributed to active corrosion). However, the cracking and/or efflorescence on the under-surface is light to moderate. The combined area of distress is less than 2% of the total deck area.

Condition State 3 The under-surface of the deck or slab shows no evidence that active corrosion is occurring in the deck (there is no rust staining or spalling which could be attributed to active corrosion). However, the cracking and/or efflorescence on the under-surface is heavy to severe. The combined area of distress is more than 2% but less than 10% of the total deck area.

Condition State 4 Light to moderate rust staining and/or spalling on the under-surface of the deck indicates that active corrosion is occurring in the deck. The combined area of distress is more than 10% but less than 25% of the total deck area.

Condition State 5 Heavy to severe rust staining and/or spalling on the under-surface of the deck indicates that active corrosion is occurring in the deck. The combined area of distress is more than 25% of the total deck area.

Element Description Number	Settlement
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405 Settlement

Condition State 1 Some of the bridge supporting elements are showing signs of visible settlement or rotation but due to earlier repairs or other signs, the settlement appears to have stabilized.

Condition State 2 Settlement or rotation of the bridge supporting elements show signs of continuing and if left un-arrested could cause adverse impacts to the bridge.

Condition State 3 Settlement or rotation of the bridge supporting elements is significant enough to warrant analysis of the bridge.

Element Number	Description Scour
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406 Scour

Condition State 1 Scour exists at the bridge site but is of little concern to the structural integrity of the bridge.

Condition State 2 Scour exists at the bridge site and if left unchecked could adversely impact the structural integrity of the bridge.

Condition State 3 Scour is significant enough to warrant analysis of the bridge.

Element Description Number	Impact Damage - Reinforced Concrete Beams
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407 Impact Damage - Reinforced Concrete Beams

Note: Do not allow a repair or maintenance action to improve the condition state of an impact-damaged beam.

Condition State 1 Bottom flange has been spalled exposing the first layer of reinforcement. Reinforcement bars are undamaged.

Condition State 2 Bottom flange has been spalled exposing one or more layers of reinforcement. Reinforcement bars have been partially severed. There may be minor cracking in web.

Condition State 3 Bottom flange has been spalled exposing on or more layers of reinforcement. Reinforcement bars have been severed with open cracks in the web. Analysis of the remaining strength and serviceability of the beam is imperative if the bridge is to remain open.

Element Description Number	Impact Damage - Prestressed Concrete Beams
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408 Impact Damage - Prestressed Concrete Beams

Note: Do not allow a repair or maintenance action to improve the condition state of an impact-damaged beam.

Condition State 1 Bottom flange has been spalled exposing the first layer of prestressing strands. Strands are undamaged.

Condition State 2 Bottom flange has been spalled exposing one or more layers of prestressing strand. Strands have been partially severed. There may be minor cracking in web.

Condition State 3 Bottom flange has been spalled exposing one or more layers of prestressing strand. Strands have been severed with open cracks in the web. Analysis of the remaining strength and serviceability of the beam is imperative if the bridge is to remain open.

Element Description
Number

Impact Damage - Steel Beams

409 Impact Damage - Steel Beams

Condition State 1 Bottom flange has been scraped exposing bare metal. Edge of flange has minor dent and distortion.

Condition State 2 Bottom flange has been scraped exposing bare metal. Edge of flange has significant distortion, distortion may extend into web. An analysis of the strength and serviceability of the beam may be desirable.

Condition State 3 Bottom flange has been scraped exposing bare metal. Flange and web have severe local distortion. Plate edges may be badly scarred and nicked. There may be tears in the base metal or welds. Analysis of the remaining strength and serviceability of the beam is imperative if the bridge is to remain open.

Element Description
Number

Impact Damage - Rail

410 Impact Damage - Rail

Condition State 1 Bridge railing has been damaged. However, the impact damage does not affect traffic safety.

Condition State 2 Bridge railing has been damaged. The impact damage affects traffic safety.

Element Description
Number

Impact Damage - Column

411 Impact Damage - Column

Note: Do not allow a repair or maintenance action to improve the condition state of an impact-damaged column.

Condition State 1 Column has been damaged. However, the impact damage does not affect structural integrity of the column.

Condition State 2 Column has been damaged. The structural integrity of the column has been affected. The extent of the damage is severe enough to warrant structural analysis.

Element Description Number	Exposed Pile or Drilled Shaft
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412 Exposed Pile or Drilled Shaft

Condition State 1 Pile or drilled shaft has been exposed due to erosion or scour. However, the extent of the exposure is minor.

Condition State 2 Pile or drilled shaft has been exposed due to erosion or scour. The extent of the exposure is moderate.

Condition State 3 Pile or drilled shaft has been exposed due to erosion or scour. The extent of the exposure is severe enough to warrant structural analysis.

Element Description Number	Impact Damage - Truss
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413 Impact Damage – Truss

Condition State 1 Truss has been scraped, exposing bare metal. Truss members have minor dents and distortion.

Condition State 2 Truss has been scraped, exposing bare metal. Truss members have significant distortion. An analysis of the strength and serviceability of the member may be desirable.

Condition State 3 Truss has been scraped, exposing bare metal. Truss members have severe local distortion. Edges may be badly scraped and nicked. There may be tears in the base metal or welds. Analysis of the remaining strength and serviceability of the member is imperative if the bridge is to remain open.

Element Description Number	Drift
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414 Drift

Condition State 1 Drift exists at bridge but is of little concern to the integrity of the bridge.

Condition State 2 Drift is extensive and if not removed may cause scour and structural problems.

Condition State 3 Drift is extensive, causing scour and hindering underwater inspections.

12 REINFORCED CONCRETE DECK

This element defines those concrete decks without protection systems (coated reinforcing or cathodic protection). The element is divided into sub-elements as shown. Report the condition state that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element. If more than one forming system is used due to widening or other cause, list as Element 12.1 Conventionally Formed.

Smart Flag 404 should be used on conventionally formed and prestressed concrete panel decks. Also, Smart Flag 403 should be used if an overlay is not present.

26 REINFORCED CONCRETE DECK WITH COATED REINFORCEMENT

This element defines those bridge decks constructed with epoxy coated reinforcing. This element is divided into sub elements as shown. Report the condition that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element. If more than one forming system is used due to widening or other cause, list as Element 26.1 Conventionally Formed.

Smart Flag 404 should be used on conventionally formed and prestressed concrete panel decks. Also, Smart Flag 403 should be used if an overlay is not present.

31 TIMBER DECK

This element defines those decks constructed of wood. The decks may be longitudinally or transversely laminated or of planks. Wearing courses such as wood runners or gravel are covered by another element. Report the condition state that most nearly represents the entire deck.

38 REINFORCED CONCRETE SLAB SPAN

This element defines those concrete slab span superstructures without protection systems (coated reinforcing or cathodic protection). Report the condition that most nearly represents the entire deck. The condition of the wearing course, if any, is covered by another element.

Note: Because of their design concept, a deck element is not used for slab spans.

40 PRESTRESSED CONCRETE DECK

This element defines only those decks constructed of prestressed concrete without protection systems (coated reinforcing or cathodic protection). Report the condition states that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element.

Smart Flag 404 should be used. Also, Smart Flag 403 should be used if an overlay is not present.

43 PRESTRESSED CONCRETE DECK WITH COATED REINFORCEMENT

This element defines only those prestressed concrete bridge decks constructed with epoxy coated reinforcing. Report the condition states that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element.

Smart Flag 404 should be used. Also, Smart Flag 403 should be used if an overlay is not present.

44 PRESTRESSED CONCRETE SLAB SPAN

This element defines only those slab span superstructures constructed of prestressed concrete without protection systems (coated reinforcing or cathodic protection). Report the condition states that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element.

45 PRESTRESSED CONCRETE SLAB SPAN WITH COATED REINFORCEMENT

This element defines only those prestressed concrete slab span superstructures constructed with epoxy coated reinforcing. Report the condition states that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element.

- 52 REINFORCED CONCRETE SLAB SPAN WITH COATED REINFORCEMENT**
This element defines those concrete slab span superstructures constructed with epoxy coated reinforcing. Report the condition state that most nearly represents the condition of the entire deck. The condition of the wearing course, if any, is covered by another element.
Note: Because of their design concept, a deck element is not used for slab spans.
- 54 TIMBER SLAB SPAN**
This element defines those slab spans superstructures made from laminated timber. Report the condition state that most nearly represents the condition of the entire deck. The condition of the timber runners or other wearing course, if any, is covered by another element.
- 56 REINFORCED CONCRETE SLAB SPAN WITH EDGE BEAMS TYPE FS**
This element defines those concrete slab span (Type FS) superstructures without protection systems (coated reinforcing or cathodic protection). Type FS slab spans have a concrete parapet along each edge that acts as edge beams. Include the area of the edge beams as part of the deck. Report the condition that most nearly represents the entire deck. The condition of the wearing course, if any, is covered by another element.
- 60 ACP OVERLAY**
This element defines asphaltic concrete pavement wearing surfaces placed on bridge decks and slabs. Report the condition state that most nearly represents the entire wearing surface.
- 61 TWO-COURSE SURFACE TREATMENT**
This element defines wearing surfaces that are constructed by two application of liquid asphalt material with each application followed by a covering of mineral aggregate. Report the condition state that best represents the entire surface.
- 62 RIGID CONCRETE OVERLAY >1"**
This element defines only separately applied wearing courses constructed of bonded concrete overlays that are more than 1" in thickness. Report the condition state that best describes the entire area. If the existence of the wearing course cannot be assured, do not use this element.
- 63 TIMBER WEARING SURFACE**
This element defines wearing surfaces/runners made of timber. Report the condition state that best describes the entire area.
- 101 BOX BEAM OR BOX GIRDER - UNPAINTED STEEL**
This element defines only those steel closed web/box girders that are not painted or are constructed of weathering steel. Report the estimated lineal feet in each condition state.
- 102 BOX BEAM OR BOX GIRDER - PAINTED STEEL**
This element defines those closed web/box girders that are painted. Report the estimated lineal feet in each condition state.
- 104 BOX BEAM OR BOX GIRDER - PRESTRESSED CONCRETE**
This element defines only those closed web/box girders constructed of prestressed concrete. Report the estimated lineal feet in each condition state. The total lineal feet is the sum of the lengths along each girder line.
Note: A Deck element is not required for element 104 unless there is separation between box beams.
- 105 BOX BEAM OR BOX GIRDER - REINFORCED CONCRETE**
This element defines only those closed web/box girders constructed of conventionally reinforced concrete. Report the estimated lineal feet in each condition state.

106 STEEL GIRDER, RIVETED OR ROLLED BEAM - UNPAINTED STEEL

This element defines only those open steel girders that are not painted or are constructed of weathering steel. Report the estimated lineal feet in each condition state.

107 STEEL GIRDER, RIVETED OR ROLLED BEAM - PAINTED STEEL

This element defines only those open girders that are painted. Report the estimated lineal feet in each condition state.

109 OPEN GIRDER - PRESTRESSED CONCRETE

This element defines only those open girders constructed of prestressed concrete. Report the estimated lineal feet in each of the condition states.

110 CONCRETE T-BEAM - REINFORCED CONCRETE

This element defines only those open girders constructed of conventionally reinforced concrete. Report the estimated lineal feet in each condition state.

Explanatory Note: Texas Pan Form Girders have arched surfaces between the stems of the beams. They typically are built in 30- and 40-foot span lengths. Because of their design concept, a deck element is not required. Pan Form Girders usually have longitudinal cracks at the top of the arch. This is thought to be a product of the forming system and shrinkage during the casting operation. If these cracks are fine and not leaking, it need not be used as reason to lower the condition state.

Each girder stem is considered for quantities (see example 1).

111 GIRDER - TIMBER

This element defines only those open girders of timber construction. Report the estimated lineal feet of girders in each condition state.

112 STRINGER - UNPAINTED STEEL

This element defines only those open steel stringers that are not painted or are constructed of weathering steel. Report the estimated lineal feet in each condition state.

113 STRINGER - PAINTED STEEL

This element defines only those open stringers that are painted. Report the estimated lineal feet in each condition state.

115 STRINGER - PRESTRESSED CONCRETE

This element defines only those open stringers constructed of prestressed concrete. Report the estimated lineal feet in each of the condition states.

116 STRINGER - REINFORCED CONCRETE

This element defines only those open stringers constructed of conventionally reinforced concrete. Report the estimated lineal feet in each condition state.

117 STRINGER - TIMBER

This element defines only those open stringers that are of timber construction. Report the estimated lineal feet of stringer in each condition state.

120 BOTTOM CHORD OF THROUGH TRUSS (OR PART THROUGH) - UNPAINTED STEEL

This element defines the bottom chord of unpainted steel trusses and those constructed of weathering steel. Report the estimated lineal feet in each condition state. Only report lengths along the span. Do not add web member lengths.

- 121 BOTTOM CHORD OF THROUGH TRUSS (OR PART THROUGH) - PAINTED STEEL**
This element defines only the bottom chord of steel trusses that are painted. Report the estimated lineal feet in each condition state. Only report lengths along the span. Do not add web member lengths.
- 125 THROUGH TRUSS EXCLUDING BOTTOM CHORD - UNPAINTED STEEL**
This element defines all elements except the bottom chord of unpainted steel trusses or those constructed of weathering steel. Report the estimated lineal feet in each condition state. Only report lengths along the span. Do not add web member lengths.
- 126 THROUGH TRUSS EXCLUDING BOTTOM CHORD - PAINTED STEEL**
This element defines all truss elements except the bottom chord of painted steel trusses. Report the estimated lineal feet in each condition state. Only report lengths along the span. Do not add web member lengths.
- 130 DECK TRUSS - UNPAINTED STEEL**
This element defines all members unpainted steel deck trusses or those constructed of weathering steel. Report the estimated lineal feet in each condition state. Only report lengths along the span. Do not add web member lengths.
- 131 DECK TRUSS - PAINTED STEEL**
This element defines all members of steel deck trusses that are painted. Report the estimated lineal feet of truss in each condition state. Only report lengths along span. Do not add web member lengths.
- 135 TRUSS/ARCH - TIMBER**
This element defines all members of trusses and arches that are constructed of timber. Report the estimated number of lineal feet in each condition state.
- 140 ARCH - UNPAINTED STEEL**
This element defines all members of only those steel arches that are unpainted or those constructed of weathering steel. Report the estimated lineal feet in each condition state. Only report lengths along the span. Do not add web member lengths.
- 141 ARCH - PAINTED STEEL**
This element defines all members of only those steel arches that are painted. Report the estimated lineal feet of truss in each condition state. Only report lengths along span. Do not add web member lengths.
- 143 ARCH - PRESTRESSED CONCRETE**
This element defines only those arch constructed of prestressed concrete. Report the estimated lineal feet in each of the condition states.
- 144 ARCH - REINFORCED CONCRETE**
This element defines only those arches (open/closed spandrel, earth filled, bowstring, etc.) stringers constructed of conventionally reinforced concrete. Report the estimated lineal feet in each condition state.
- 145 ARCH - OTHER**
This element defines only those arches made with materials other than steel, concrete or timber (such as masonry). Report the lineal feet in each condition state.
- 151 FLOOR BEAM - UNPAINTED STEEL**
This element defines only those steel floor beams that are not painted or are constructed of weathering steel. Report the estimated lineal feet in each condition state.

152 FLOOR BEAM - PAINTED STEEL

This element defines only those steel floor beams that are painted. Report the estimated lineal feet in each condition state.

154 FLOOR BEAM - PRESTRESSED CONCRETE

This element defines only those floor beams constructed of prestressed concrete. Report the estimated lineal feet in each of the condition states.

155 FLOOR BEAM - REINFORCED CONCRETE

This element defines only those floor beams constructed of conventionally reinforced concrete. Report the estimated lineal feet in each condition state.

156 FLOOR BEAM - TIMBER

This element defines only those floor beams that are of timber construction. Report the estimated lineal feet of stringer in each condition state.

160 PIN & HANGER ASSEMBLY - UNPAINTED STEEL

Report the number of pin and hanger assemblies in each condition state.

161 PIN & HANGER ASSEMBLY - PAINTED STEEL

Report the number of pin and hanger assemblies in each condition state.

163 SECONDARY MEMBERS - UNPAINTED STEEL

This element defines only those steel secondary members that are not painted or are constructed of weathering steel. Report the number of members in each condition state. On trusses, consider the bracing between panel points as a unit. On girders, consider the lateral bracing between diaphragms as a unit.

164 SECONDARY MEMBERS - PAINTED STEEL

This element defines only those steel secondary members that are painted. Report the number of members in each condition state. On trusses, consider the bracing between panel points as a unit. On girders, consider the lateral bracing between diaphragms as a unit.

165 SECONDARY MEMBERS - PRESTRESSED CONCRETE

This element defines those secondary members that are constructed of prestressed concrete. Report the number of members in each condition state.

166 SECONDARY MEMBERS - REINFORCED CONCRETE

This element defines only those secondary members that are constructed or conventionally reinforced concrete. Report the number of members in each condition state.

167 SECONDARY MEMBERS - TIMBER

This element defines only those secondary members of timber construction. Report the number of members in each condition state

201 PILE EXTENSION - UNPAINTED STEEL

This element defines only those steel column or pile extensions that are not painted or are constructed of weathering steel. Report the number of column or pile extensions in each condition state.

202 PILE EXTENSION - PAINTED STEEL

This element defines only those steel column of pile extensions that are painted. This element is divided into the sub elements shown. Report the number of columns or pile extensions in each condition state.

- 204 COLUMN OR PILE EXTENSION - PRESTRESSED CONCRETE**
This element defines columns or pile extensions that are constructed of prestressed concrete. The element is divided into sub-elements as shown. Report the number of pile or column extensions in each condition state.
- 205 COLUMN OR PILE EXTENSION - REINFORCED CONCRETE**
This element defines only those columns or pile extensions that are constructed or conventionally reinforced concrete. It is divided into sub-elements as shown. Report the number of columns or pile extensions in each condition state.
- 206 PILE EXTENSION - TIMBER**
This element defines only those columns and pile extensions of timber construction. It is divided into sub-elements as shown. Report the number of columns or pile extensions in each condition state
- 210 PIER BENT - REINFORCED CONCRETE**
This element defines only those pier bents constructed of conventionally reinforced concrete. Report the lineal feet of pier wall in each condition state.
- 211 PIER BENT - OTHER**
This element defines pier bents constructed of material other than concrete (such as masonry).
Report the lineal feet of pier wall/bent in each condition state
- 212 PIER BENT - PRESTRESSED CONCRETE**
This element defines only those pier bents constructed of prestressed concrete. Report the lineal feet of pier wall in each condition state.
- 213 ABUTMENT - UNPAINTED STEEL**
This element defines only those abutments made of unpainted steel or weathering steel. Report the lineal feet of abutment in each condition state.
- 214 ABUTMENT - PAINTED STEEL**
This element defines only those steel abutments that are painted. Report the lineal feet of abutment in each condition state.
- 215 ABUTMENT - REINFORCED CONCRETE**
This element defines only those abutments constructed of conventionally reinforced concrete.
Report the lineal feet of abutment in each condition state.
- 216 ABUTMENT - TIMBER**
This element defines those abutments constructed of timber. Report the lineal feet of abutment in each condition state.
- 217 ABUTMENT - OTHER**
This element defines abutments that are constructed of material other than steel, concrete or timber (such as masonry). Report the lineal feet of abutment in each condition state.
- 218 SPREAD FOOTING - REINFORCED CONCRETE**
This element defines only those spread footings constructed of conventionally reinforced concrete. Spread footings differ from the pile caps/footing element in that the spread footing transmits the load directly to the soil or ground. Report the number of spread footings in each condition state.
- 220 SUBMERGED PILE CAP/FOOTING - REINFORCED CONCRETE**
This element defines conventionally reinforced concrete pile caps that were constructed below the ground or water line and that can now be inspected using underwater techniques. Report the number of pile caps in each condition state.

221 PILE CAP - REINFORCED CONCRETE

This element defines only conventionally reinforced concrete pile caps that were originally constructed at or above the original ground or water line. Report the number of pile caps in each condition state.

222 PILE CAP - PRESTRESSED CONCRETE

This element defines only prestressed concrete pile caps that were originally constructed at or above the ground or water line. Report the number of pile caps in each condition state.

225 SUBMERGED PILING - UNPAINTED STEEL

This element defines only those unpainted submerged steel piling that are accessible by underwater inspection. The element is divided into sub elements as shown. Report the number of piles in each condition state.

226 SUBMERGED PILING - PRESTRESSED CONCRETE

This element defines only those submerged piling that are constructed of prestressed concrete and are accessible by underwater inspection. Report the number of piling in each condition state.

227 SUBMERGED PILING/DRILLED SHAFT - REINFORCED CONCRETE

This element defines only submerged, conventionally reinforced concrete piling that are accessible by underwater inspection. The element is divided into sub elements as shown. Report the number of piling in each condition state.

228 SUBMERGED PILING - TIMBER

This element defines only submerged timber piling that are accessible by underwater inspection. Report the number of timber piles in each condition state.

230 BENT CAP - UNPAINTED STEEL

This element defines only those steel bent caps are not painted or are constructed of weathering steel. Report the lineal feet of bent cap in each condition state.

231 BENT CAP - PAINTED STEEL

This element defines only those steel bent caps that are painted. Report the lineal feet of bent cap in each condition state.

233 BENT CAP - PRESTRESSED CONCRETE

This element defines only those bent caps constructed of prestressed concrete. Report the lineal feet bent cap in each condition state.

234 BENT CAP - REINFORCED CONCRETE

This element defines only those bent caps constructed of conventionally reinforced concrete. Report the lineal feet of bent cap in each condition state.

235 BENT CAP - TIMBER

This element defines those bent caps constructed of timber. Report the lineal feet of bent cap in each condition state.

240 CULVERT - STEEL

This element defines metal (steel, aluminum, etc.) culverts including arches, round or elliptical pipes etc. It includes galvanized steel culverts. Report the estimated number of lineal feet of culvert in each condition state.

Note: Measure culverts in linear feet along the length of each barrel.

241 CULVERT - REINFORCED CONCRETE

This element defines all precast and cast-in-place (conventionally reinforced or prestressed) concrete square, rectangular, arch, round, or elliptical pipes. Report the estimate number of lineal feet of culvert in each condition state.

Note: Measure culverts in linear feet along the length of each barrel.

242 CULVERT - TIMBER

This element defines only those culverts constructed of timber. Report the estimated number of lineal feet of culvert in each condition state.

Note: Measure culverts in linear feet along the length of each barrel.

243 CULVERT - OTHER

This element defines all those culverts made from materials other than metal, reinforced concrete or timber. It includes masonry construction and combinations of other materials. Report the estimated number of lineal feet of culvert in each condition state.

Note: Measure culverts in linear feet along the length of each barrel.

257 TIE BEAM - UNPAINTED STEEL

This element defines only those steel tie beams that are not painted or are constructed of weathering steel. Report the number of tie beams in each condition state.

258 TIE BEAM - PAINTED STEEL

This element defines only those steel tie beams that are painted. Report the number of tie beams in each condition state.

259 TIE BEAM - PRESTRESSED CONCRETE

This element defines only tie beams that are constructed of prestressed concrete. Report the number of tie beams in each condition state.

260 TIE BEAM - REINFORCED CONCRETE

This element defines only conventionally reinforced concrete tie beams. Report the number of tie beams in each condition state.

261 TIE BEAM - TIMBER

This element defines only tie beams of timber construction. Report the number of tie beams in each condition state.

262 WEB WALL - REINFORCED CONCRETE

This element defines only conventionally reinforced concrete web walls. Report the number of web walls in each condition state.

263 RETAINING WALL - METAL

This element defines all types and shapes of metal retaining walls (steel, aluminum, metal beam, rolled shapes, etc.). It may or may not be galvanized or painted. Retaining walls are not attached to the abutment. Report only on those walls that support soil/fill immediately adjacent to the abutment. This includes walls in front of the abutment transverse to the roadway or walls that parallel the roadway. Include a maximum of 20 lineal feet of wall that parallels the roadway. Report the estimated area in square feet of retaining wall in each condition state.

264 RETAINING WALL - REINFORCED CONCRETE

This element defines only those retaining walls constructed of conventionally reinforced concrete. Retaining walls are not attached to the abutment. Report only those walls that support soil/fill immediately adjacent to the abutment. This includes walls that are located in front of the abutment transverse to the roadway or walls that parallel the roadway. Include a maximum of 20 lineal feet of wall that parallels the roadway. Report the estimated area in square feet of retaining wall in each condition state.

265 RETAINING WALL -TIMBER

This element defines those retaining walls constructed of timber. Retaining walls are not attached to the abutment. Report only on those walls that support soil/fill immediately adjacent to the abutment. This includes walls in front of the abutment transverse to the roadway or walls that parallel the roadway. Include a maximum of 20 lineal feet of wall that parallels the roadway. Report the estimated square feet of retaining wall in each condition state.

269 WINGWALL - METAL

This element defines all types and shapes of metal wingwalls (steel, aluminum, metal beam, rolled shapes, etc.). It may or may not be galvanized or painted. Wingwalls are attached to the abutment. Report the number of wing walls in each condition state.

270 WINGWALL - REINFORCED CONCRETE

This element defines only those wing walls constructed of conventionally reinforced concrete. Wingwalls are attached to the abutment. Report the number of wing walls in each condition state.

271 WINGWALL - TIMBER

This element defines those wingwalls constructed of timber. Wingwalls are attached to the abutment. Report the number of wingwalls in each condition state.

272 RIP RAP SLOPE PROTECTION - REINFORCED CONCRETE

This element defines rip rap or slope paving constructed of non-reinforced or conventionally reinforced concrete. The rip rap may be separated into sections by preformed joint material. Report the condition state that best describes each protected slope (usually two on each bridge).

273 RIP RAP SLOPE PROTECTION - OTHER

This element defines rip rap or slope paving constructed of rock, bagged concrete or other material. Report the condition state that best describes each protected slope (usually two on each bridge).

274 WING WALLS - OTHER

This element defines wing walls constructed of material other than concrete (such as masonry). Report the number of wing walls in the each state.

300 STRIP SEAL EXPANSION JOINT

This element defines those expansion joint devices which utilize a neoprene type waterproof gland with some type of steel extrusion or other system to anchor the gland.

301 POURABLE JOINT SEAL

This element defines only those joints filled with a pourable material. Report the estimated lineal feet of joint in each condition state.

302 COMPRESSION JOINT SEAL

This element defines only those joints filled with a pre-formed compression type seal. Report the estimated lineal feet in each condition state.

303 ASSEMBLY JOINT SEAL

This element defines only those joints filled with an assembly mechanism that may or may not have a seal. Report the estimated lineal feet in each condition state.

304 OPEN EXPANSION JOINT

This element defines only those joints that are open and not sealed. Report the estimated lineal feet in each condition state.

310 ELASTOMETRIC BEARING

This element defines only those bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement. Report the number of bearings in each condition state.

311 MOVABLE BEARING (ROLLER, ROCKER, SLIDING, ETC.)

This element defines those bridge bearings that provide both deflection and longitudinal movement by means of roller, rocker or sliding mechanisms. Report the number of bearings in each condition state.

312 ENCLOSED/CONCEALED BEARING OR BEARING SYSTEM

This element defines those bearings and/or bearing systems that are enclosed so that they are not open for detailed inspections. This includes Pot Bearings. The potential for catastrophic failure due to a reduction of bearing area because of prestress shortening should be considered when rating this element. Report the number of bearings in each condition state.

313 FIXED BEARING

This element defines those bridge bearings that provide for deflection only. Report the number of bearings in each condition state.

314 POT BEARING

This element defines those 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. Report the number of bearings in each condition state.

315 DISK BEARING

This element defines those high load bearings with a hard plastic disk. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction. Report the number of bearings in each condition state.

321 APPROACH SLAB - REINFORCED CONCRETE

This element defines those structural sections between the bridge abutment and the approach pavement that are constructed of conventionally reinforced concrete. These structural sections may be separated into multiple slabs by longitudinal joints (there may be one approach slab per traffic lane and there may only be one approach slab for the entire bridge approach). Report the number of approach slabs in each condition state.

330 BRIDGE RAIL - METAL

This element defines all types and shapes of metal bridge railing (steel, aluminum, metal beam, rolled shapes, etc.). All elements of the rail must be metal. It may or may not be galvanized or painted. Report the lineal feet of rail in each condition state.

331 BRIDGE RAIL - REINFORCED CONCRETE

This element defines all types and shapes of reinforced concrete bridge rail. All elements of the rail must be concrete. Report the lineal feet of rail in each condition state.

332 BRIDGE RAIL - TIMBER

This element defines all types and shapes of timber railing. All elements of the railing (except connectors) must be timber. Report the lineal feet of rail in each condition state.

333 BRIDGE RAIL - OTHER

This element defines all types and shapes of railing except those already defined as METAL, CONCRETE or TIMBER. This element will include cable rails, combinations of timber, concrete and metal etc.. Metal portions may or may not be painted or galvanized. Report the lineal feet of rail in each condition state.

340 APPROACH RAIL - METAL

This element defines all types and shapes of metal approach railing (steel, aluminum, metal beam, rolled shapes, etc.). All elements of the rail must be metal. It may or may not be galvanized or painted. If rail is continuous for some distance along the approach, report on only the 150 feet closest to the abutment. Report the lineal feet of rail in each condition state.

343 APPROACH RAIL - REINFORCED CONCRETE

This element defines all types and shapes of reinforced concrete approach rail. All elements of the rail must be concrete. If rail is continuous for some distance along the approach, report on only the 150 feet closest to the abutment. Report the lineal feet of rail in each condition state.

344 APPROACH RAIL - TIMBER

This element defines all types and shapes of timber approach railing. All elements of the railing (except connectors) must be timber. If the rail is continuous for some distance along the approach, report on only the 150 feet closest to the abutment. Report the lineal feet of rail in each condition state.

345 APPROACH RAIL - OTHER

This element defines all types and shapes of approach railing except those already defined as METAL, CONCRETE or TIMBER. This element will include cable rails, combinations of timber, concrete and metal etc.. Metal portions may or may not be painted or galvanized. If the rail is continuous for some distance along the approach, report on only the 150 feet closest to the abutment. Report the lineal feet of rail in each condition state.

401 STEEL - FATIGUE

This element exists only on those bridges with steel elements which are already showing fatigue damage. It should not be applied to steel bridges prior to fatigue damage becoming apparent. Once established, deterioration modeling can be used to obtain transition probabilities. This element exists only on those bridges with steel elements which are already showing fatigue damage. It should not be applied to steel bridges prior to fatigue damage becoming apparent. Once established, deterioration modeling can be used to obtain transition probabilities.

402 PACK RUST

This element defines only those connections (including shapes in contact in built-up members) of steel bridges which are already showing signs of rust packing between steel plates.

403 DECK CRACKING

This condition state language addresses deck cracking. Once a deck begins to show other distress more significant than cracking (spalling/delamination) the status of this Smart Flag is probably not important.

404 SOFFIT - UNDERSIDE OF CONCRETE DECKS AND SLABS

This condition state language addresses deck distresses through visual inspections of the deck soffit (under-surface). It is useful when the top surface of the deck is covered with an overlay.

405 SETTLEMENT

This condition state language addresses substructure settlement distresses which are evident during visual inspections. Its primary purpose is to identify bridges that are experiencing settlement and to provide some measure of the magnitude of that settlement. The normal CoRe condition state language for substructure elements does not address settlement.

406 SCOUR

This condition state language addresses scour distresses which are evident during visual inspections. Its primary purpose is to identify bridges that are experiencing scour and to provide some measure of the magnitude of scour.

407 IMPACT DAMAGE - REINFORCED CONCRETE BEAMS

This condition state language addresses damage to reinforced concrete beams caused by impacts from over height loads which is evident during visual inspections. The normal CoRe element condition state language does not adequately address damage caused by impacts.

Note: Do not allow a repair or maintenance action to improve the condition state of an impact-damaged beam.

408 IMPACT DAMAGE - PRESTRESSED CONCRETE BEAMS

This condition state language addresses damage to prestressed concrete beams caused by impacts from over height loads which is evident during visual inspections. The normal CoRe element condition state language does not adequately address damage caused by impacts.

Note: Do not allow a repair or maintenance action to improve the condition state of an impact-damaged beam.

409 IMPACT DAMAGE - STEEL BEAMS

This condition state language addresses damage to steel beams caused by impacts from over height loads which is evident during visual inspections. The normal CoRe element condition state language does not adequately address damage caused by impacts.

410 IMPACT DAMAGE - RAIL

This condition state language addresses damage to bridge railing caused by impacts from vehicles which is evident during visual inspections. The normal CoRe element condition state language does not adequately address damage caused by impacts.

411 IMPACT DAMAGE - COLUMN

This condition state language addresses damage to columns caused by impacts from vehicles which is evident during visual inspections. The normal CoRe element condition state language does not adequately address damage caused by impacts.

Note: Do not allow a repair or maintenance action to improve the condition state of an impact-damaged column.

412 EXPOSED PILE OR DRILLED SHAFT

This condition state language addresses those piles or drilled shafts that were originally below the natural ground but may have been exposed due to a change in the ground level. They may be below a pile cap.

413 IMPACT DAMAGE - TRUSS

This condition state language addresses damage to truss members caused by impact from vehicles or floating debris.

414 DRIFT

This condition state language addresses drift deposits of an amount that the inspector determines could be detrimental to the structure.

General Information

Explanation of Key Terms

Elements

Elements are single components or parts of a bridge, characterized by the type of member and its material, at the level of detail required for network analysis. The BMS organizes the elements into five groups: 1) Decks and Slabs, 2) Wearing surfaces, 3) Superstructure, 4) Substructure, and 5) Other. Tables one (1) through five (5) list the elements in each group. A unique, whole number has been assigned to each element.

There are two types of elements, **CoRe** elements and **Non-CoRe** elements. **CoRe** elements are those elements **Commonly Recognized** by all the states using the PONTIS decision support tool. The **Non-CoRe** elements have been added to the list to support other bridge management functions.

Some elements have been further divided into **Sub-Elements**. Sub-elements are provided to identify differing construction techniques or different member shapes within the element. For example, the deck element is divided into sub-elements based on the forming system used. The prestressed open girder element is divided into I-Beam and T-Beam shapes. Sub-elements have been assigned a unique number that contains a decimal.

While a definition of a majority of the Elements is not needed by an experienced bridge inspector, the following elements may benefit from some explanation.

Wearing surfaces: Quite often the deck or slab is covered with an asphaltic overlay or is covered by enough dirt and gravel to make a closer inspection impossible. In the case of an asphaltic overlay, rate the condition of the asphalt, reasoning that any breakup of the asphalt may be caused by delamination or other fault in the concrete. Gravel on the deck is a different problem. We can only rate what we see, so if the deck or slab is 25 to 100% covered, base your ratings on the under side of the deck or slab. Look for cracks, efflorescence, leakage and other signs of deterioration. Include Smart Flag 404 for Bottom Soffit.

Bridge Joints: When selecting the proper element for a bridge joint, try to use the type of joint that was originally intended. For example, if the joint originally held a compression seal but it is completely gone, list it as a Compression Joint Seal (Element 302) rather than an open joint but give it a poor condition state rating. Strip Seal Expansion Joints (Element 300) use thin neoprene sheets clamped between steel plates or inserted into special steel castings to seal the expansion joint. Assembly (Modular) Joint Seals (Element 303) are complex metal devices that usually have more than one neoprene compression or strip seal to accommodate larger expansion movements. Pourable Joint Seal (Element 301) is used if the joint has been sealed with a hot poured bitumen or a silicon sealer.

Column or Pile Extension: This is the part of a bent that is above the ground or water line and extends up to the bent cap. Do not include web walls between columns as these are handled as a separate element. Solid piers are handled as a separate element.

Bent Cap: That part of a bent that spans between columns or piles that support the beams or slab span. Solid piers do not normally have a cap.

Abutments: There are two broad categories of abutments: 1) stub or spill through and 2) retaining. The stub or spill through is most commonly used in TxDOT designs. It might be compared to a pile bent but with embankment filling the area below the bent cap and spilling through to form the end slope. The only visible portion is the abutment bent cap that supports the beams or slab and the back wall that retains the approach roadway pavement and fill. For the spill through abutment, evaluate the cap and back wall as a unit. Do not include the wing walls in this element. If erosion or settlement has exposed a short section of pile or drilled shaft under the abutment and maintenance to replace the material is unlikely, note the piles or drilled shafts as an **Exposed Pile or Drilled Shaft** (Smart Flag 412).

Retaining abutments do not allow approach fill to spill through and form an end slope. If the retaining wall is an integral part of the abutment, evaluate the wall as part of the abutment. If the retaining wall is separate, often used with MSE type walls, evaluate the **Abutment** element separately from the **Retaining Wall** element.

Spread Footing: This part of a substructure refers to a thick reinforced concrete slab like element that transfers the load directly to the ground or soil. Spread footings support columns, piers or abutments. If a determination cannot be made as to whether the element is a spread footing or a pile cap, use the **Pile Cap** element as spread footings are an uncommon design in TxDOT practice. The term "Mud Sill" is sometimes used for small, usually unreinforced, spread footings on off-system roads.

Pile Cap: This part of the substructure refers to an element that ties a group of driven piles or drilled shafts together. Pile caps support a column or pier. Separate elements are provided for pile caps that are visible at or above the ground or water line and those that are submerged. Submerged pile caps must be evaluated by an underwater inspection.

Material Type

Five material types are included in the manual: 1) Steel, 2) Prestressed Concrete, 3) Conventionally Reinforced Concrete, 4) Timber, and 5) Other. The first four types need little additional explanation. The fifth, Other, includes other construction materials such as stone masonry, aluminum and synthetics. In addition, elements that are made from combinations of materials such as some bridge rails are to be included in the Other category.

Units

The units of measurement for the elements and condition states may be any of the following; 1) Each, 2) Linear Feet, and 3) Square Feet. Recording the data in the units assigned to each element is very important as PONTIS assigns a corresponding maintenance, rehabilitation or replacement cost based on these units.

Condition State

A condition state is a particular classification of the condition of a bridge element. Bridge elements transition among condition states as the result of deterioration and maintenance. Narrative descriptions differentiate between the three to five condition states for each element. The inspector is asked to select the condition state that best represents the condition of the element or to estimate the quantity of the element in each condition state.

Condition States are different from condition or appraisal ratings that have historically been used with BRINSAP/NBIS inspections. In BRINSAP/NBIS inspections, the like-new or best condition or appraisal rating is nine (9), and a single value must be assigned to represent the item. In PONTIS, the like-new or best condition state is one (1), and the quantity of the element may be divided among the condition states.

Smart Flags

Smart flags are included as a method to identify local problems which cannot be modeled in PONTIS because they may not follow a logical pattern of deterioration. A smart flag will look and operate like an element. It has multiple stages of deterioration that, however, do not have feasible actions or costs associated with them. They are useful to assist TxDOT in tracking conditions of distress which may warrant other bridge management actions.

Inspection Process

How to Start

The easiest way to do an inspection for elemental data and condition states may be establishing a routine and following it through every time. We recommend that you start with the top of the bridge and work down. Look first at the deck and approach roadways, noting the rail and joints. Then move below and check for the type and condition of the beams, bearings, caps, columns and footings. Finally, check to see if any special items or smart flags apply. This sequence follows the organization of the elements in the field manual and may make it easier to remember element names and numbers and avoid leaving some of them unrecorded.

Identifying and Recording Elements

There are some 149 elements and smart flags listed in this manual. While this may seem an unmanageable list, a little experience will quickly make you comfortable with the 50 or so most common elements. The six matrices list the elements with codes and footnotes to indicate those elements that are unusual and seldom found in Texas.

Routine bridges will have fewer than 20 elements. If constructed plan sets are available in the district, it may be efficient and economical to identify the elements and quantities in an office setting. The partially completed form could then be taken to the field, elements verified and condition states completed. The BMS Data Sheet has been developed to record elemental data and condition states. Copies of this form can be obtained by contacting the BRINSAP Section of the Design Division.

Example 1: As a first example, consider one of the most common bridge types in Texas, the Pan Form Girder. A typical stream crossing might have 5-40' spans, a 38' clear roadway width and T101 bridge rail. The substructure might be constructed with 6-pile interior bents and spill through abutments. It may have an asphalt wearing course and the end/abutment slopes may be plated with stone riprap. There is severe local scour at one of the bents. The following list contains the elements that might be needed during the inspection.

Item 60	ACP Overlay
Item 110.1	Open Girder - Reinforced Concrete- Pan Form Girder
Item 215	Abutment-Reinforced Concrete
Item 234	Bent Cap-Reinforced Concrete
Item 204.2	Pile Extension - Prestressed Concrete
Item 270	Wing Walls - Reinforced Concrete

Item 273	Rip Rap Slope Protection - Other (Stone)
Item 301	Pourable Joint Seal - Other
Item 330	Bridge Rail - Steel
Item 340	Approach Rail - Metal
SF 406	Scour

This simple and common type of structure requires only ten elements and one smart flag. Because the top slab on the pan form girder acts structurally with the stem or beam, we do not use a deck item. The same is true for slab spans. Table 1 contains the elements with the appropriate unit as they might appear on the inspection form.

Example 2: This bridge is a 30' wide by 300' three span continuous steel plate girder, carrying ramp D over connection A in an interchange. The abutments have expansion bearings and interior bents are fixed. There is a sealed expansion joint located at both abutments; however, one of the joint seals is missing. The bridge railing is T501, and approach railing is continuous through the interchange area. There is a 2" ACP overlay. Slope protection on the abutments is concrete. There are steel diaphragms at each bearing and at mid span between the four girder lines. There is some impact damage on the exterior girder. The following list contains the elements that might be found during the inspection.

Item 12.2	Deck - Permanent Metal Deck Forms
Item 60	ACP Overlay
Item 107	Open Girder - Coated Steel
Item 164	Secondary Members (Diaphragms) - Coated Steel
Item 215	Abutments - Reinforced Concrete
Item 234	Bent Caps - Reinforced Concrete
Item 205.1	Column - Reinforced Concrete
Item 270	Wing Walls - Reinforced Concrete
Item 272	Rip Rap Slope Protection - Reinforced Concrete
Item 302	Compression Joint Seal (Armour Joint with PJS)
Item 311	Movable Bearing (Steel Rocker)
Item 313	Fixed Bearing (Steel)
Item 331	Bridge Rail - Reinforced Concrete
Item 340	Approach Rail - Steel
SF 409	Impact Damage - Steel Beams

Table 2 contains the elements with the appropriate units as they might appear on the inspection form.

Estimating Quantities

Using these same examples it is relatively easy to estimate the total quantity of each element to be evaluated for condition state.

Example 1: The deck area is the product of the length and width, [38' X 200 '= 7600 SF]. Standards for a 38" roadway indicated that the Pan Form superstructure would have 10 beam lines (9 pans, 10 girders, each stem will be counted as a girder)[10 X

200'=2000 LF]. Abutments are generally the width of the roadway [2 X 38'=76 LF]. Bent caps are approximately the width of the roadway [4 X 38'=152 LF]. If bents or abutments are skewed the quantity should be adjusted accordingly. Each bent has 6 piles [4 X 6 = 24]. Expansion joints might be anticipated at alternate bents [3 X 38' = 114 LF]. Bridge rail length is approximately twice the length of the bridge [2 X 200'= 400 LF]. Approach rails meeting current standards often have approximately 150' on an approach end and 75' on the exit end [2 X (150'+75')= 450 LF].

In addition to placing the totals in the appropriate column (see Example 1), we recommend that notes be kept on how totals were obtained for future reference. If quantities are taken from as built plans, they should be verified during the field visit.

Example 2: The deck area is $[30' \times 300' = 9000 \text{ SF}]$. There are four lines of steel girders $[4 \times 300 = 1200 \text{ LF}]$. Three bays with diaphragms at bearings and mid span $[3 \times (4+3) = 21]$. Abutments are $[2 \times 30 = 60 \text{ LF}]$. Bent caps are $[2 \times 30 = 60 \text{ LF}]$. For a 30' roadway assume 2 column bents. If the approach rail is continuous throughout the interchange area include only 150' on each end of the bridge for inspection $[4 \times 150' = 600 \text{ LF}]$. The remaining items are relatively self-explanatory column (see Example 2).

TEXAS DEPARTMENT OF TRANSPORTATION

ELEMENTS (BMS)

BRIDGE I.D.: XX-XXX-XXXX-XX-XXX

District - County - Control - Section - Structure No.

Route Carried: Ramp D

Feature Crossed: Connection A

EXAMPLE 2

BRIDGE LENGTH: 300 (FT)

DECK WIDTH 30 (FT)

SKEW ANGLE: 0 (DEG)

DECK AREA 9000 (SF)

-See Back of Form for Tabulation by Bent or Span

Element No.	DESCRIPTION	Unit	Total	CONDITION STATE						
				1	2	3	4	5		
	WEAR. SURFACE	Avg. Thk. = 2 in. (60) ACP	EA	1	1					
	DECK	(12.2) Prm.Mtl.D.F.	EA	1			1			
	JOINTS	(302) Compression	LF	60	53	5	2			
	BRIDGE RAIL	(331) Concrete	LF							
	APPROACH RAIL	(340) Metal	LF	600	520	50	30			
	BM. IMPACT DMG.	(409) Steel	EA	1		1				
	STEEL GIRDER	Painted Bm. (107) Pl.Gr or Rolled	LF	1200	594	564	42			
	SECOND. MEMB.	(164) Painted Steel	EA	21	18	3				
	BEARING	(311) Movable	EA	8	5	2	1			
	BEARING	(313) Fixed	EA	8	7	1				
	ABUTMENT	(215) R/C (including backwalls)	LF	60	26	19	15			
	WINGWALLS	(270) R/C	EA	4	3	1				
	BENT CAP	(234) R/C	LF							
	COLUMN	(205.1) R/C	EA	4	3	1				
	RIPRAP	(272) R/C	EA	4	3		1			
	IMPACT	(409) Damage - Steel Beams	EA	1		1				

Span Configurations ->

check if: - DEF - 2 COLUMN BENT

Initials / Date: / Steel

Determining Condition States

The following paragraph is repeated for emphasis.

Condition States are different from condition or appraisal ratings that have historically been used with BRINSAP/NBIS inspections. In BRINSAP/NBIS inspections, the like-new or best condition or appraisal rating is nine (9), and a single value must be assigned to represent the item. In PONTIS, the like-new or best condition state is one (1), and the quantity of the element may be divided among the condition states.

Until you become familiar with the language of the common elements and condition states it may be necessary to review the information presented in this guide regularly to insure that the correct concept is being used.

The Condition State of decks and slab span elements differ from other elements in that the inspector is asked to "report the condition state that most nearly represents the entire deck or slab span". The unit for these elements is "Each" and the condition state language uses percentages to quantify the severity of the condition observed during the site visit. In Example 2, the inspector might determine that there are repaired areas and/or spalls/delaminations existing in the deck surface and that the combined area of distress is between 2% and 10% of the deck area. Therefore a "1" would be entered in **Condition State 3** for Element 12.2 (Deck on PMDF) in Example 2.

There are a number of non deck and slab elements that use "Each" as the unit of measure. However, this type element may have more than one unit. For these elements, the inspector is asked to count the number of a certain type element in each Condition State and record that number. In the first example there are a total of 24 Pile Extensions (Element 204.2). If one half (12) show no deterioration and one half (12) have minor cracks and spalls but no evidence of corrosion, these figures would be entered into Example 1 under **Condition States 1 & 2**.

Elements that do not use "Each" as the unit of measure use Linear Feet (LF). A visit to the Route 66 over Dry Creek bridge site might reveal that the exterior pan form girders have four (4) Linear Feet of girder near the midpoint of each span that has delaminations, spalls and rebar exposed but no significant corrosion (Condition State 3). Approximately one half of the interior girders have four (4) Linear Feet of girder in each span with minor cracks and spalls but no reinforcing visible. The quantities in each condition state would then be calculated as follows:

$$\begin{aligned}\text{Condition State 3} &= [2 \text{ exterior} \times 5 \text{ spans} \times 4 \text{ LF}] \\ &= 40 \text{ LF}\end{aligned}$$

$$\begin{aligned}\text{Condition State 2} &= [7 \text{ interior} \times 5 \text{ spans} \times 4 \text{ LF}] \\ &= 140 \text{ LF}\end{aligned}$$

$$\begin{aligned}\text{Condition State 1} &= \text{Total} - [\text{Condition State 2} + 3] \\ &= 1620 \text{ LF}\end{aligned}$$

These quantities would then be placed in the appropriate line and column for Element 110.1

in Example 1. Insure that all quantities are counted.

Abutments and bent caps would be evaluated in similar fashion. If the joint seal on one of the abutments for Ramp D over Connection A has failed, the inspector might determine that one half (15 LF) of the abutment has some delaminations, some exposed reinforcing with some corrosion present (Condition State 3). The remainder of this abutment (15 LF) has minor cracks and spalls (Condition State 2). The second abutment with the seal intact has 2 LF on each end with minor cracks and spalls but no exposed reinforcing or corrosion (Condition state 2). The quantities in each condition state would then be recorded as follows:

$$\begin{aligned}\text{Condition State 3} &= 15 \text{ LF} \\ \text{Condition State 2} &= [15 \text{ LF (Abutment 1)} + 4 \text{ LF (Abutment 2)}] \\ &= 19 \text{ LF} \\ \text{Condition State 1} &= 60 - [15 + 19] \\ &= 26 \text{ LF}\end{aligned}$$

The interior steel beams on Ramp D might be in generally good condition (Condition State 1). The exterior beams show little or no active corrosion. The paint system on these may show some chalking and peeling (Condition State 2). The inspection reveals the paint system on three (3) Linear Feet of the end of each beam adjacent to Abutment 1 has failed due to water and salts leaking through the joint. Surface pitting has begun but section loss is minor (Condition State 4). In addition, poorly designed scuppers at mid span have caused the same **Condition State** to exist for five (5) Linear Feet on the exterior girder lines. The quantities in each condition state would be recorded as follows:

$$\begin{aligned}\text{Condition State 4} &= [4 \text{ Beams X } 3 \text{ LF}] + [2 \text{ Beams X } 3 \text{ Spans X } 5 \text{ LF}] \\ &= 12 \text{ LF} + 30 \text{ LF} \\ &= 42 \text{ LF} \\ \text{Condition State 2} &= [2 \text{ Beams x } 300 \text{ LF}] - [2 \text{ Beams x } (3 + 15) \text{ LF}] \\ &= 600 \text{ LF} - 36 \text{ LF} \\ &= 564 \text{ LF} \\ \text{Condition State 1} &= 1200 \text{ LF} - (42 \text{ LF} + 564 \text{ LF}) \\ &= 594 \text{ LF}\end{aligned}$$

As a final example, the inspector might note that the exterior girder on the span over Connection A has received minor impact damage. Bare metal has been exposed and the edge of the flange has minor dents. A one (1) should be entered in Condition State 1 for **Smart Flag 409, Impact Damage - Steel Beams**.

Similar scenarios could be constructed for the remaining elements but will not be in the interest of conserving space. Please contact your BRINSAP Coordinator for help.

The examples presented here were for routine and fairly simple structures. However, the principles that apply to these simple bridges would apply as well to larger and more complex structures. When large numbers of bents, beams, etc., are encountered, it may be necessary and desirable to establish some simple accounting procedure or system of notes to keep track of quantities in each **Condition State**.

TEXAS DEPARTMENT OF TRANSPORTATION

ELEMENTS (BMS)

BRIDGE I.D.: _____

District - County - Control - Section - Structure No. _____

Route Carried: _____

Feature Crossed: _____

BRIDGE LENGTH _____ (FT) DECK WIDTH _____ (FT)

SKEW ANGLE _____ (DEG) DECK AREA _____ (SF)

-See Back of Form for Tabulation by Bent or Span

Element No.	DESCRIPTION	Unit	Total	CONDITION STATE				
				1	2	3	4	5
	DECK CRACKING (403) Flag	EA						
	WEAR. SURFACE Avg. Thk. = _____ in. (60) ACP (61) T.C.S.T.	EA						
	WEAR. SURFACE (62) CONC. > one inch	EA						
	DECK (12.1) R/C (12.2) Prm.Mtl.D.F. (12.3) P.S.Pnl.	EA						
	DECK (40) P.S. Conc. Deck (max. cond. state is 4)	EA						
	JOINTS (300) Strip Seal E.J. (301) Pourable J.S.	LF						
	JOINTS (302) Compression (303) Assembly	LF						
	JOINTS (304) Open Joint	LF						
	BRIDGE RAIL (330) Metal	LF						
	BRIDGE RAIL (331) Concrete (332) Timber (333) Comb.	LF						
	APPROACH RAIL (340) Metal	LF						
	APPROACH RAIL (343) Concrete (344) Timber (345) Comb.	LF						
	APPROACH SLAB (321) R/C	EA						
	BM. IMPACT DMG. (407) R/C (408) P.S. Conc. (409) Steel	EA						
	SOFFIT (404) Flag (underside of deck)	EA						
	P.S.CONC. BEAM (104) Box (109.1) Girder (109.2) T. & Dbl. T	LF						
	P.S.CONC. BEAM (104) Box (109.1) Girder (109.2) T. & Dbl. T	LF						
	SECOND. MEMB. (164) Painted Steel	EA						
	SECOND. MEMB. (163) Unpaint. Stl. (165) P.S.Conc. (166) R/C	EA						
	BEARINGS (310) Elastomeric	EA						
	ABUTMENT (215) R/C (including backwalls)	LF						
	WINGWALLS (270) R/C	EA						
	BENT CAP (233) P.S. (234) R/C	LF						
	TIE-BEAM (260) R/C	EA						
	COLUMN (204.1) P.S. (205.1) R/C	EA						
	PILING (204.2) P.S. (205.2) R/C	EA						
	RIPRAP (272) R/C (273) Other	EA						
	RETAIN. WALL (264) R/C	SF						

Span Configurations ->

check if: - DEF

- 2 COLUMN BENT

Initials / Date: /

P.S. Conc. Box or Girder or Tee

TEXAS DEPARTMENT OF TRANSPORTATION

ELEMENTS (BMS)

BRIDGE I.D.: _____

District - County - Control - Section - Structure No. _____

Route Carried: _____

Feature Crossed: _____

BRIDGE LENGTH _____ (FT) DECK WIDTH _____ (FT)

SKEW ANGLE _____ (DEG) DECK AREA _____ (SF)

-See Back of Form for Tabulation by Bent or Span

Element No.	DESCRIPTION	Unit	Total	CONDITION STATE				
				1	2	3	4	5
	DECK CRACKING (403) Flag	EA						
	WEAR. SURFACE Avg. Thk. = _____ in. (60) ACP (61) T.C.S.T.	EA						
	WEAR. SURFACE (62) CONC. > one inch	EA						
	DECK (12.1) R/C (12.2) Prm.Mtl.D.F. (12.3) P.S.Pnl.	EA						
	DECK (40) P.S. Conc. Deck (max. cond. state is 4)	EA						
	JOINTS (300) Strip Seal E.J. (301) Pourable J.S.	LF						
	JOINTS (302) Compression (303) Assembly	LF						
	JOINTS (304) Open Joint	LF						
	BRIDGE RAIL (330) Metal	LF						
	BRIDGE RAIL (331) Concrete (332) Timber (333) Comb.	LF						
	APPROACH RAIL (340) Metal	LF						
	APPROACH RAIL (343) Concrete (344) Timber (345) Comb.	LF						
	APPROACH SLAB (321) R/C	EA						
	BM. IMPACT DMG. (407) R/C (408) P.S. Conc. (409) Steel	EA						
	SOFFIT (404) Flag (underside of deck)	EA						
	STEEL GIRDER Unpaint. Bm. (101) Box (106) Pl.Gr or Rolled	LF						
	STEEL GIRDER Painted Bm. (102) Box (107) Pl.Gr or Rolled	LF						
	SECOND. MEMB. (164) Painted Steel	EA						
	SECOND. MEMB. (163) Unpaint. Stl. (165) P.S.Conc. (166) R/C	EA						
	BEARING (311) Movable (313) Fixed	EA						
	BEARING (314) Pot (315) Disk	EA						
	ABUTMENT (215) R/C (including backwalls)	LF						
	WINGWALLS (270) R/C	EA						
	BENT CAP (233) P.S. (234) R/C	LF						
	TIE-BEAM (260) R/C	EA						
	COLUMN (204.1) P.S. (205.1) R/C	EA						
	PILING (204.2) P.S. (205.2) R/C	EA						
	RIPRAP (272) R/C (273) Other	EA						
	RETAIN. WALL (264) R/C	SF						

Span Configurations ->

check if: - DEF

- 2 COLUMN BENT

Initials / Date: /

Steel

TEXAS DEPARTMENT OF TRANSPORTATION

ELEMENTS (BMS)

BRIDGE I.D.: _____

District - County - Control - Section - Structure No. _____

Route Carried: _____

Feature Crossed: _____

BRIDGE LENGTH _____ (FT) DECK WIDTH _____ (FT)

SKEW ANGLE _____ (DEG) DECK AREA _____ (SF)

-See Back of Form for Tabulation by Bent or Span

Element No.	DESCRIPTION	Unit	Total	CONDITION STATE				
				1	2	3	4	5
	DECK CRACKING (403) Flag	EA						
	WEAR. SURFACE Avg. Thk. = _____ in. (60) ACP (61) T.C.S.T.	EA						
	DECK (12.1) R/C (12.2) Prm.Mtl.D.F. (12.3) P.S.Pnl.	EA						
	JOINTS (300) Strip Seal E.J. (301) Pourable J.S.	LF						
	JOINTS (302) Compress. (303) Assembly (304) Open	LF						
	BRIDGE RAIL (330) Metal	LF						
	BRIDGE RAIL (331) Concrete (332) Timber (333) Comb.	LF						
	APPROACH RAIL (340) Metal	LF						
	APPROACH RAIL (343) Concrete (344) Timber (345) Comb.	LF						
	APPROACH SLAB (321) R/C	EA						
	BM. IMPACT DMG. (407) R/C (408) P.S. Conc. (409) Steel	EA						
	TRUSS IMPACT (413) Flag (Truss damage)	EA						
	SOFFIT (404) Flag (underside of deck)	EA						
	TRUSS - PAINTED (126) Thru (except bott.chord) (131) Deck Tr.	LF						
	TR. BOTT. CHORD (121) Bottom Chord of Thru Truss - Painted	LF						
	FLOOR BEAM (152) Steel Floorbeam - Painted	LF						
	STRINGER (113) Steel Stringer - Painted	LF						
	STEEL GIRDER Painted Bm. (102) Box (107) Pl.Gr or Rolled	LF						
	SECOND. MEMB. (164) Painted Steel	EA						
	SECOND. MEMB. (163) Unpaint. Stl. (165) P.S.Conc. (166) R/C	EA						
	BEARING (311) Movable (313) Fixed	EA						
	BEARING (314) Pot (315) Disk	EA						
	ABUTMENT (215) R/C (including backwalls)	LF						
	WINGWALLS (270) R/C	EA						
	PIER BENT (210) R/C	LF						
	PILE CAP (221) R/C	LF						
	BENT CAP (233) P.S. (234) R/C	LF						
	TIE-BEAM (260) R/C	EA						
	COLUMN (204.1) P.S. (205.1) R/C	EA						
	PILING (204.2) P.S. (205.2) R/C	EA						
	RIPRAP (272) R/C (273) Other	EA						
	RETAIN. WALL (264) R/C	SF						

Span Configurations ->

check if: - DEF

- 2 COLUMN BENT

Initials / Date: /

Truss & Steel

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