



New Jersey Department of Transportation

# BRIDGE ELEMENT INSPECTION MANUAL



MAY 2, 2014

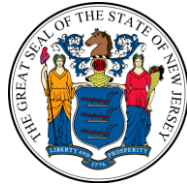
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Prepared By

Structural Evaluation & Bridge Management

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## Introduction

The proper assessment of the condition of bridge elements is the cornerstone of sound bridge management. The introduction of element inspection condition methods in the early 1990s represented a significant advancement in the bridge inspection practice and has been adopted by the New Jersey Department of Transportation. As per Section 1111 of the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21) modified 23 U.S.C. 144, each State is required to report bridge elements level data to the Secretary of FHWA. Bridge owners nationwide have recognized the benefits of detailed condition assessments through the use of the raw inspection information, expanded performance measures, and bridge management system deterioration forecasting and evaluation. As the use of element level inspection techniques has proliferated, the need for updates and enhancements to the standard element specification has been identified. The *Bridge Element Inspection Manual* incorporates improvements through changes in the measurement units of decks and slabs, the development of a wearing surface element, the standardization of the number of element states, the development of protective coating elements for concrete and steel, deck protection systems, and agency developed elements and defects. Elements constructed of innovative materials are also identified. The goal of this manual is to completely capture the condition of bridges in a simple, effective way that can be standardized across the nation while providing the flexibility to be adapted to both large and small agency settings.

This manual is not intended to supersede proper bridge and element inspection training or the exercise of engineering judgment by the inspector or professional engineer.

**The manual has been revised to incorporate AASHTO interim revisions 2015 to *AASHTO Manual for Bridge Element Inspection 2013*, and the NJDOT revisions. The changes made to this document are shown in BOLD RED fonts. The ~~STRIKETHROUGH TEXT~~ indicates any deletions. A list of affected articles is shown in Appendix G of this manual.**

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## 1.0 Background

### 1.1 Philosophy

The *Bridge Element Inspection Manual* builds on the element level condition assessment methods developed in the *AASHTO Guide for Commonly Recognized Structural Elements*. Improvements have been made to fully capture the condition of the elements by reconfiguring the element language to utilize multiple distress paths within the defined condition states. The multi-path distress language provides the means to fully incorporate all possible defects within the overall condition assessment of the element. The overall condition of an element can be utilized in the aggregate form, or broken down into specific defects for Bridge Management System (BMS) use.

The *Bridge Element Inspection Manual* provides a comprehensive set of bridge elements that is designed to be flexible in nature to satisfy the needs of all agencies. The complete set of elements capture the components necessary for an agency to manage all aspects of the bridge inventory utilizing the full capability of a BMS.

The element set presented within includes three element types identified as National Bridge Elements (NBE), Bridge Management Elements (BME), or Agency Defined Elements (ADE). The combination of these NBE and BME element types comprise the full AASHTO 2013 element set. All of the elements, whether they are NBE, BME, or ADE, have the same general condition assessment characteristics:

1. Standard number of condition states is four.
2. The standard condition states are comprised of good, fair, poor, and severe general descriptions.
3. Units of measure are LENGTH in feet, AREA in square feet, and EACH for enumerated elements.

### 1.2 National Bridge Elements (NBEs)

The National Bridge Elements represent the primary structural components of bridges necessary to determine the overall condition and safety of the primary load carrying members. The NBEs are a refinement of the deck, superstructure, substructure, and culvert condition ratings defined in the Federal Highway Administration's *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*. Additional elements included in this section are bridge rail and bearings. The NBEs are designed to remain consistent from agency to agency across the country in order to facilitate and standardize the capture of bridge element condition at the national level. In order to capture the diversity of new element design types and materials, many elements in this category have an 'Other' type element defined.

### 1.3 Bridge Management Elements (BMEs)

Bridge Management Elements include components of bridges such as **joints**, **wearing surfaces**, and **protective coating systems** and **deck/slab protection systems** that are typically managed by agencies utilizing Bridge Management Systems. The BMEs are defined with a recommended set of condition

assessment language that has been modified to suit the NJDOT needs as these elements are not intended to be utilized for the purposes of national policy making. The BMEs defined within this manual were purposefully left fairly general in nature to provide the flexibility to develop agency specific elements that best suit the local bridge management practices. NJDOT has developed additional BMEs as necessary using the agency-developed element conventions discussed below. For the additional agency defined elements, factors such as element performance, deterioration rates, feasible actions, and preservation costs, as well as the practical considerations of training and inspection costs were considered.

## 1.4 Agency Developed Elements (ADEs)

The elements presented within provide the flexibility for an agency to define custom elements in accordance with the defined element framework that may be sub-elements of NBEs or BMEs, or may be agency defined elements without ties to the elements defined in this manual.

By defining a comprehensive set of bridge elements necessary for robust bridge management and the minimum set of elements necessary to assess the condition of primary components of bridges, the Bridge Element Inspection Manual provides a flexible element set that can be tailored to the needs of all agencies. The identification numbers 800 and above are used in this manual for any ADEs.

Agency elements fall into three main categories: subsets of defined National Bridge Elements, subsets of defined Bridge Management Elements, or elements that are entirely independent of the defined elements.

### 1.4.1 Agency Defined Subsets of the NBEs

The National Bridge Elements (NBEs) represent the primary structural components of bridges and are of national concern for safety. The NBE elements are intended to form an element basis for bridge condition assessment in the National Bridge Inventory (NBI). Due to the higher purpose for these NBEs, the flexibility for an agency to customize them is limited. An agency is permitted to create NBE sub-elements providing that the sub-elements can be aggregated back together for NBI submission. In all cases, the element condition states are fixed at four (4) states and the specific condition state and defect criteria must remain consistent between the NBE and all agency developed NBE sub-elements. For example, many agencies have developed elements to capture the quantity and condition of their “beam ends”. This agency developed element isolates the area around joints or hinges to capture the rapid deterioration that may occur in this area. Since the beam element itself is a NBE, this agency developed sub-element would need to inherit all of the language characteristics of the encompassing NBE. In this example, the agency will simply subdivide the element quantity between two items that both share the same language. Combining the NBE beam element and the agency developed “beam ends” together is simple addition and would permit consistent reporting of the quantity and condition distribution of this item to the NBI.

### 1.4.2 Agency Defined Subsets of the BMEs

Agency developed elements that are not a subset of a NBE have considerably more flexibility in customization. The Bridge Management Elements (BMEs) represent many components of the bridges that require preservation but are not primary structural members. These elements include joints, wearing surfaces, protective coatings, and deck protection systems. These elements as a class are defined to provide a sound basis for bridge management. In order to identify these additional agency elements, the number range of 800 and above has been reserved.

This manual has defined a set of basic BMEs with the expectation that agencies may opt for considerably more detail in certain areas. For example, an agency may wish to individually define the wearing surfaces typically used in their bridge inventory into their own wearing surface elements in order to track performance and recognize cost differences for actions. In this example, these detailed wearing surface elements would be sub-elements of the general BME for wearing surfaces. For this wearing surface example, an agency would still be required to define only four condition states following the good, fair, poor, and severe convention. However, the BME would not need to be “rolled” up (aggregated) for national reporting unless the particular element information is required for submission to the FHWA for inclusion in the NBI.

When developing a sub-element of one of the defined 500 series BMEs, the agency needs to consider the potential impacts on the deterioration modeling in their BMS. The BMEs for protective coatings, wearing surfaces, and protection systems may need to be set-up to influence the deterioration rates of certain elements. The relationship between these “protective” BMEs and other elements (NBEs or BMEs) must be considered if the agency wishes to have the deterioration modeling influenced by the protective element. For example, the steel protective coating element (BME # 515) defines condition state language that covers conventional paint systems, weathering steel, and galvanized protective coatings. An agency may wish to break these three classes of protective coatings into their own BME to capture performance or cost differences between them. All of these protective coatings will influence the rate of deterioration of the base element that they are designed to protect. Bridge Management Systems (BMS) such as the AASHTOWare Bridge Management software program will slow or eliminate deterioration of the base element as long as the protective element is in good condition. This relationship between protective system and base element will constrain the degree of customization that an agency can exercise on the condition state element definitions of sub-elements to the 500 series of BMEs.

### 1.4.3 Independent Agency Defined Elements

Agencies may identify a business need to develop a completely independent custom element that is not a subset or derivative of an NBE or BME. Such custom elements provide the most flexibility as these elements are not intended to be reported at a national level, nor are they expected to be rolled up into any element with defined condition state language in this manual. These elements are available for agencies utilizing bridge management systems to track elements unique to their inventory, such as movable bridge components, or to capture specific performance aspects of bridges. Independent agency defined elements may or may not have defined feasible actions, defined deterioration, and need not follow any condition state or defect language included in this manual. These are free-form elements that are only limited by the number of required condition states (four).

Examples of independent agency developed elements could include: approach guardrails, slope paving, seismic retrofit components, or tunnels just to name a few. Independent agency elements could also be created to track maintenance items that an agency wishes to capture during the inspection process. Items such as the condition of drains, structure lighting, appurtenances, or bridge identification plaques could be developed into elements that are not associated with deterioration but potentially have feasible actions.

Independent agency developed elements can also be created to capture the components and condition of ancillary structures that an agency may wish to inspect. These elements can coexist side by side with the bridge elements and can optionally be defined with deterioration models or feasible actions as an agency desires. Custom element definitions provide a ready-made framework for capturing items such as tunnels, walls, median barriers, high mast lighting, and overhead sign structures within an agency’s BMS.

#### 1.4.4 NJDOT Developed ADEs

NJDOT has carried over the *Non-CoRe* as well as *Sub-CoRe* Elements from *2003 Pontis Element Level Coding Guide* to AASHTO 2013 ADEs into new *Bridge Element Inspection Manual*. Some of the old agency defined Non-CoRe and Sub-CoRe Elements are now transferred into new AASHTO 2013 NBEs and/or BMEs, and few are dropped from the manual. Based on the current and future business needs, NJDOT has developed several new ADEs completely independent as well as sub elements of an NBE or BME.

See Appendix A for detailed listing of NJDOT defined ADEs.

#### 1.5 How to Use This Manual

Bridge inspection based on this manual consists of defining the elements (pieces of the bridge) and total quantities that exist at each bridge. The condition of each element is determined by performing a field inspection and recording quantities of the element that have identified defects that correlate to the severity of the defects defined in the particular condition state definition of this Manual. The condition assessment is complete when the appropriate portion of the total quantity is stratified over the defined condition states. For agencies utilizing bridge management systems, the appropriate element defects and environment shall be recorded for use in deterioration modeling.

In this manual, the element represents the aggregate condition of the defined element inclusive of all defects. The specific listing of all defects is optional; however the element condition must be inclusive of all defined defects. Element defects are typically to be used when the element's condition reaches state 2 or lower and essentially act to break down the overall element condition into one or more specific observed problems. The defects defined within this manual shall always assume the units of the element that they are associated with. For example, the scour defect may be applied to a column or a pier wall. The defect language is the same for both elements, however the units for the column defect would be each and the units for the pier wall would be linear feet. In some cases, multiple defects may operate in the same defined space. In this case, the inspector shall report the defect in the most severe conditions state. If two defects in the same condition state operate in the same defined space, the inspector shall determine the predominate defect for reporting. For example, if a reinforced concrete bridge deck is cracked throughout and also has a spall in a portion of the deck, the spalling would likely be determined to be the predominate defect.

This manual attempts to cover the vast majority of all bridge elements found on highway bridges in the United States. An inspector may find materials or elements that are not defined during the course of their inspection. In these cases, the inspector should use judgment to select the closest element match or use the 'Other' element type. In a similar vein, **the inspector should use judgment when utilizing the condition state defect definitions.** There may be cases when the specific condition observed in the field is not defined in this manual. In these cases, the inspector should use the general description of the condition states to determine the appropriate condition.

The granularity of the defect details is typically not specified with defect descriptive language for condition state 4, as this state is reserved for severe conditions that are beyond the specific defects defined for states 1 through 3. Elements with a portion or all of the quantity in state 4 may often have load capacity implications warranting a structural review. Within this manual, the term structural review is defined as a review by a person qualified to evaluate the field observed conditions and make a determination of the impacts of the conditions on the performance of the element. Structural reviews may

include a review of the field inspection notes and photographs, review of as-built plans or analysis as deemed appropriate to evaluate the performance of the element. Agencies may establish additional guidance to aid the inspector in determining the field circumstances where structural review is warranted taking into consideration the education, training and experience of their inspection staff.

## 1.6 Organization

Section 2 of the manual presents table of all the elements and identification numbers for quick reference. Each element is displayed within the NBE, BME or ADE category, then by major bridge component, element type, and material.

Section 3 of the manual presents a detailed definition of each element with its applicable defects. Guidelines for measurement and condition assessment are included where appropriate.

The appendix section provides additional guidance and background on the use of this manual. There are five appendices to aid an agency in the development of their data collection process.

These appendices are:

A –NJDOT Developed Elements

B –NJDOT Inspection Examples

C –NJDOT Element Groupings

D –NJDOT List of Element Defects by Material Type

E –NJDOT List of Feasible Actions by Material Type

F – NJDOT Guidance on Quantity Calculation

**G – NJDOT List of Revised Articles**

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## 2.0 Element Tables

This section is designed to give inspectors a quick reference guide to the defined elements. The elements are grouped into National Bridge Elements (NBEs), Bridge Management Elements (BMEs), and Agency Developed Elements (ADEs), then by general element type, material, and in accordance to their physical location on the bridge to facilitate ease of use by bridge inspectors in the field.



## 2.1 National Bridge Elements

### 2.1.1 Decks and Slabs

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Deck	sq. ft.		13	12	31		60
Deck – Top Flange	sq. ft.		15	16			
Deck – Open Grid	sq. ft.	28					
Deck – Concrete Filled Grid	sq. ft.	29					
Deck – Corrugated / Orthotropic / Etc.	sq. ft.	30					
Slab	sq. ft.			38	54		65

### 2.1.2 Bridge Railings

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Bridge Railing	ft.	330		331	332	334	333

### 2.1.3 Superstructure

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Girder/Beam	ft.	107	109	110	111		112
Closed Web/Box Girder	ft.	102	104	105			106
Stringer	ft.	113	115	116	117		118
Truss	ft.	120			135		136
Arch	ft.	141	143	144	146	145	142
Floor Beam	ft.	152	154	155	156		157
Cable – Primary	ft.	147					
Cable – Secondary	each	148					149
Gusset Plate	each	162					
Pin, Pin and Hanger Assembly, or both	each	161					

### 2.1.4 Bearings

Element	Units	Element Number
Elastomeric Bearing	each	310
Moveable (roller, sliding, etc.) Bearing	each	311
Enclosed/Concealed Bearing	each	312
Fixed Bearing	each	313
Pot Bearing	each	314
Disk Bearing	each	315
Other Bearing	each	316

### 2.1.5 Substructure

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Columns	each	202	204	205	206		203
Column Tower (Trestle)	ft.	207			208		
Pier Wall	ft.			210	212	213	211
Abutment	ft.	219		215	216	217	218
Pile	each	225	226	227	228		229
Pier Cap	ft.	231	233	234	235		236
Pile Cap/Footing	ft.			220			

### 2.1.6 Culverts

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Culvert	ft.	240	245	241	242	244	243

## 2.2 Bridge Management Elements

### 2.2.1 Joints

Element	Units	Element Number
Strip Seal Expansion Joint	ft.	300
Pourable Joint Seal	ft.	301
Compression Joint Seal	ft.	302
Assembly Joint/Seal (Modular)	ft.	303
Open Expansion Joint	ft.	304
Assembly Joint without Seal	ft.	305
Other Joint	ft.	306

### 2.2.2 Approach Slabs

Element	Units	Element Number
Prestressed Concrete Approach Slab	sq. ft.	320
Reinforced Concrete Approach Slab	sq. ft.	321

### 2.2.3 Wearing Surfaces, Protective Coatings and Concrete Reinforcing Steel Protective Systems

Element	Units	Element Number
Wearing Surfaces	sq. ft.	510
Steel Protective Coating	sq. ft.	515
Concrete Reinforcing Steel Protective System	sq. ft.	520
Concrete Protective Coating	sq. ft.	521

## 2.3 Agency Defined Elements (800+)

### 2.3.1 Decks and Slabs

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Curbs/Sidewalks	ft.	801		802	803		804
Sound barrier wall on/attached to Structure	ft.						805

### 2.3.2 Superstructure

Element	Units	Element Number
Seismic Retrofit Components	each	811
Bridge Mounted Sign Structures	each	812

### 2.3.3 Bearings

Element	Units	Element Number
Isolation Bearing	each	831
Sliding Plate Bearing - Expansion/Moveable	each	832
Rocker Bearing - Expansion/Moveable	each	833
Spherical Bearing	each	834
Bond Breaker Bearing - Expansion/Moveable	each	835

### 2.3.4 Substructure

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other Material
Slope Protection	ft. each						841
Wingwalls	ft.			842	843	844	845
Headwalls	ft.			846		847	848
Fender System	each						849
Bulkhead	ft.						850

### 2.3.5 Joints

Element	Units	Element Number
Elastomeric Flex-Type Joint	ft.	861
Asphaltic Plug Expansion Joint	ft.	862

### 2.3.6 Other

Element	Units	Element Number
Concrete Encasement	ft.	891
Bridge Drainage	each	892
Temporary Support Structures	each	893

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## 3.0 Detailed Element Descriptions

This section describes the bridge elements detailed use in inspection and bridge management. Each detailed description for an element is broken down into three sub-sections:

1. **Description** — Detailed identification and classification of the element, including units of measurement, and guide-lines on how to collect the quantity of the element in a consistent manner.
2. **Condition State Definitions** — Defect descriptions and severity, with guidelines to the inspector for determining defect severity.
3. **Element Commentary** — Additional considerations for the inspector to be aware of during data collection.

All the elements described in this chapter are included in the standard set of National Bridge Elements (NBEs), except where noted for Bridge Management Elements (BMEs) such as joints and approach slabs. The elements are organized by major groupings such as Decks and Slabs, Superstructure, Substructure, Joints, and Bearings. The defects identified for each element are further detailed in Appendix D.

### 3.1 Decks and Slabs

These elements describe the component that is transferring load from the vehicle to the bridge. This section does not include secondary deck elements such as joints, deck/slab protection systems, or wearing surfaces.

Deck elements transmit the loads into superstructure elements. Slab elements transmit the load into the substructure elements. Structures that include slab elements typically do not have superstructure elements. These elements transmit traffic loads directly into the substructure. All deck or slab elements can be supplemented with one or more associated protection systems or wearing surface elements.

### 3.1.1 Element #: 12 — Reinforced Concrete Deck

**Description:** This element defines all reinforced concrete bridge decks regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012-0.05 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

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

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.1.2 Element #: 13 — Prestressed Concrete Deck

**Description:** This element defines all prestressed concrete bridge decks regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004-0.009 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

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

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.1.3 Element #: 38 — Reinforced Concrete Slab

**Description:** This element defines all reinforced concrete bridge slabs regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

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

The inspector should use judgment when utilizing the condition state defect definitions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.1.4 Element #: 15 — Prestressed Concrete Top Flange

**Description:** This element defines all prestressed bridge girder top flanges where traffic rides directly on the structural element regardless of the wearing surface or protection systems used. These bridge types include bulb-tees, box girders and girders that require traffic to ride on the top flange.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the top flange from edge to edge including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004–0.009 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

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

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.1.5 Element #: 16 — Reinforced Concrete Top Flange

**Description:** This element defines all reinforced concrete bridge girder top flanges where traffic rides directly on the structural element regardless of the wearing surface or protection systems used. These bridge types include tee-beams, box girders, and girders that require traffic to ride on the top flange.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the top flange from edge to edge including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 - 0.05 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

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

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.1.6 Element #: 28 — Steel Deck with Open Grid

**Description:** This element defines all open grid steel bridge decks with no fill.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, edges or all, and being captured using the defined condition states. When the steel grid deck has concrete fill in the wheel tracks only, use Element 29 for the concrete filled portion and Element 28 for the unfilled portion of the deck.

### 3.1.7 Element #: 29 — Steel Deck with Concrete Filled Grid

**Description:** This element defines steel bridge decks with concrete fill either in all of the openings or within the wheel tracks.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, edges or all, and being captured using the defined condition states. Materials added for riding surface is not part of the element condition.

### 3.1.8 Element #: 30 — Steel Deck Corrugated/Orthotropic/Etc.

**Description:** This element defines those bridge decks constructed of corrugated metal filled with Portland cement, asphaltic concrete, or other riding surfaces. Orthotropic steel decks are also included.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

**Element Commentary**

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, edges or all, and being captured using the defined condition states. Materials added for riding surface is not part of the element condition.

### 3.1.9 Element #: 31 — Timber Deck

**Description:** This element defines all timber bridge decks regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

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

Timber running planks shall be included under the wearing surface assessment.

### 3.1.10 Element #: 54 — Timber Slab

**Description:** This element defines all timber bridge slabs regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The slab evaluation is three dimensional in nature with the defects observed on the top and bottom surface, edges or all, and being captured using the defined condition states. Timber running planks shall be included under the wearing surface assessment.

### 3.1.11 Element #: 60 — Other Deck

**Description:** This element defines all bridge decks constructed of other materials regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The deck evaluation is three dimensional in nature with the defects observed on the top and bottom surface, edges or all, and being captured using the defined condition states. The other material deck is intended for decks constructed of composite materials, or other materials that cannot be classified using any other defined deck element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.1.12 Element #: 65 — Other Slab

**Description:** This element defines all slabs constructed of other materials regardless of the wearing surface or protection systems used.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element includes the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The slab evaluation is three dimensional in nature with the defects observed on the top and bottom surface, edges or all, and being captured using the defined condition states. The other material slab is intended for slabs constructed of composite materials, or other materials that cannot be classified using any other defined slab element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide

### 3.1.13 Agency Defined Element #: 801 — Steel Curbs/Sidewalks

**Description:** This element defines steel curbs and/or sidewalks on the bridge deck regardless it is painted or not or constructed of weathering steel.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of curbs/sidewalk.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (Curbs/ Sidewalk) (8004)	None.	Minor	Moderate, but does not warrant maintenance review.	The condition warrants a maintenance review to determine the effectiveness of sidewalk and curbs on the bridge; OR a maintenance review has been completed.

#### Element Commentary

Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4. Do not use this Element for Reinforced Concrete Curbs/Sidewalks with steel nose angles attached; instead use Element # 802 – Concrete Curbs/Sidewalks.

### 3.1.14 Agency Defined Element #: 802 — Concrete Curbs/Sidewalks

**Description:** This element defines only those curbs and/or sidewalks on the bridge deck that are constructed of concrete.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of curbs and/or sidewalk.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.
Settlement (Curbs/ Sidewalk) (8004)	None.	Minor	Moderate, but does not warrant maintenance review.	The condition warrants a maintenance review to determine the effectiveness of sidewalk and curbs on the bridge; OR a maintenance review has been completed.

### Element Commentary

The Condition State language for this element allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide

### 3.1.15 Agency Defined Element #: 803 — Timber Curbs/Sidewalks

**Description:** This element defines only those curbs and/or sidewalks on the bridge deck that are constructed of timber.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of curbs and/or sidewalk.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.
Settlement (Curbs/Sidewalk) (8004)	None.	Minor	Moderate, but does not warrant maintenance review.	The condition warrants a maintenance review to determine the effectiveness of sidewalk and curbs on the bridge; OR a maintenance review has been completed.

### Element Commentary

None

### 3.1.16 Agency Defined Element #: 804 — Other Curbs/Sidewalks

**Description:** This element defines those curbs and/or sidewalks on the bridge deck that are constructed of material other than steel, concrete or timber.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of curbs and/or sidewalk.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.
Settlement (Curbs/Sidewalk) (8004)	None.	Minor	Moderate, but does not warrant maintenance review.	The condition warrants a maintenance review to determine the effectiveness of sidewalk and curbs on the bridge; OR a maintenance review has been completed.

### **Element Commentary**

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.



## 3.2 Railings and Sound Barrier Wall

This section covers bridge rail, which may be fabricated from steel, other metal, concrete, masonry, and other materials.

This section also covers sound barrier wall on or attached to the structure which may be constructed of any material.

### 3.2.1 Element #: 330 — Metal Bridge Railing

**Description:** This element defines all types and shapes of metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. will all be considered part of this element. Included in this element are the posts of metal, timber or concrete, blocking, and curb.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

### **Element Commentary**

The number of rows of rail on a bridge is commonly two, one on each side of the traveled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lane. Refer to the other bridge rail material elements (concrete, timber, masonry, other) for specific defects for assessing the condition of posts, blocking and curbs that may be constructed of materials other than metal.

### 3.2.2 Element #: 331 — Reinforced Concrete Bridge Railing

**Description:** This element defines all types and shapes of reinforced concrete bridge railing. All elements of the railing must be concrete.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012-0.05 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The number of rows of rail on a bridge is commonly two, one on each side of the traveled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lane.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.2.3 Element #: 332 — Timber Bridge Railing

**Description:** This element defines all types and shapes of timber bridge railing. Included in this element are the posts of timber, metal or concrete, blocking, and curb.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the number of rows of bridge rail times the length of the bridge. The quantity for this element includes only the rail on the bridge.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The number of rows of rail on a bridge is commonly two, one on each side of the traveled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lane. Refer to the other bridge rail material elements (metal, concrete, masonry, other) for specific defects for assessing the condition of posts, blocking and curbs that may be constructed of materials other than timber.

### 3.2.4 Element #: 333 — Other Bridge Railing

**Description:** This element defines all types and shapes of bridge railing except those defined as metal, concrete, timber, or masonry.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element should be used for materials not otherwise defined. The number of rows of rail on a bridge is commonly two, one on each side of the traveled way. In some cases there may be more than two rows when the bridge has a center median or protected pedestrian/bicycle lane.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.2.5 Element #: 334 — Masonry Bridge Railing

**Description:** This element defines all types and shapes of masonry block or stone bridge railing. All elements of the railing must be masonry block or stone.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The number of rows of rail on a bridge is commonly two, one on each side of the bridge. In some cases there may be more than two rows when you have a center median or protected pedestrian/bicycle lane.

### 3.2.6 Agency Defined Element #: 805 — Sound Barrier Wall on/attached to Structure

**Description:** This element includes sound barrier wall on or attached to the structure which may be constructed of any material

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all lengths of sound wall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant Structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

See Appendix A3 for additional guidance.

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## 3.3 Superstructure

Superstructure elements described in this section transmit load from decks into the substructure. These elements include girders, trusses, arches, and floor systems. The floor systems include floor beams and stringers. Additional elements in this group include cables, gusset plates, and pin or pin and hanger assemblies. These elements do not include bracing members such as diaphragms, cross bracing, or portal sway bracing.

### 3.3.1 Girders

These elements transmit the loads from the deck into the substructure. Elements listed include closed web (boxes) and open girders (I sections). The materials include steel, reinforced and prestressed concrete, and timber.

### 3.3.1.1 Element #: 102 — Steel Closed Web/Box Girder

**Description:** This element defines all steel box girders or closed web girders, and is for all box girders regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of each box girder section. The quantity can be determined by counting the visible web faces, dividing by two, and then multiplying by the appropriate length.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners, or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	
				The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.



**Element Commentary**

The box girder evaluation is three dimensional in nature with the defects observed on exterior and interior surfaces being used to capture the condition states. The previously pitted steel may be aesthetically unpleasing, but if no structural strength is lost it is not a problem. Girders are inspected per lineal foot of girder. This includes the top flange, web, and bottom flange. Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4.

### 3.3.1.2 Element#: 104 — Prestressed Concrete Closed Web/Box Girder

**Description:** This element defines all pretensioned or post-tensioned concrete closed web girders or box girders, and is for all box girders regardless of protective system. This includes voided and non-voided Prestressed Concrete Slabs.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the ~~number of girders multiplied by the span length~~ **sum of the length of each box girder section. This quantity can be determined by counting the visible web faces, dividing by two, and then multiplying by the appropriate length of the box section. Element such as adjacent box girders are considered individual girders.**

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004 - 0.009 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The box girder evaluation is three dimensional in nature which includes defects observed on exterior and interior surfaces. Where traffic rides directly on the structural element, regardless of the wearing surface, evaluation of the top flange above the fillet is considered with Element # 15 – Prestressed Concrete Top Flange.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.3.1.3 Element#: 105 — Reinforced Concrete Closed Web/Box Girder

**Description:** This element defines all reinforced concrete box girders or closed web girders, and is for all box girders regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the ~~number of girders multiplied by the span length~~ sum of the length of each box girder section. This quantity can be determined by counting the visible web faces, dividing by two, and then multiplying by the appropriate length of the box section. Element such as adjacent box girders are considered individual girders.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012-0.05 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Where traffic rides directly on the structural element, regardless of the wearing surface, evaluation of the top flange above the fillet is considered with Element # 16 – Reinforced Concrete Top Flange. The Condition State language for reinforced concrete allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.1.4 Element #: 106 — Other Closed Web/Box Girder

**Description:** This element defines all other material box girders or closed web girders, and is for all other material box girders regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the ~~number of girders multiplied by the span length~~ **sum of the length of each box girder section. This quantity can be determined by counting the visible web faces, dividing by two, and then multiplying by the appropriate length of the box section. Element such as adjacent box girders are considered individual girders.**

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 - 0.05 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The box girder evaluation is three dimensional in nature with the defects observed including exterior and interior surfaces being used to capture the condition states. The other material box girder is intended for box girders constructed of composite materials, or other materials that can-not be classified using any other defined box girder element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.1.5 Element #: 107 — Steel Open Girder/Beam

**Description:** This element defines all steel open girders, and is for all girders regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of each girder.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	



### **Element Commentary**

Condition evaluation for this element includes the web face and the top and bottom faces of the flange. This element includes two girder systems as well as rolled beams on multiple beam spans. This includes the top flange, web, and bottom flange. Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4. For Steel Open Girders/Beams with Concrete Encasement, use Element # 107 along with Element # 891 – Concrete Encasement. If all of the concrete encasement has been removed from a member, that member should not use Element # 891. If any encasement reinforcing steel is exposed or corroded, it should only be considered as it relates to the condition of the concrete encasement and not the condition of the underlying structural steel member.

### 3.3.1.6 Element #: 109 — Prestressed Concrete Open Girder/Beam

**Description:** This element defines pretensioned or post-tensioned concrete open web girders, and is for all girders regard-less of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of each girder.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004 – 0.009 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Where traffic rides directly on the structural element, regardless of the wearing surface, evaluation of the top flange above the fillet is considered with Element # 15 – Prestressed Concrete Top Flange.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.3.1.7 Element #: 110 — Reinforced Concrete Open Girder/Beam

**Description:** This element defines mild steel reinforced concrete open web girders, and is for all girders regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each girder.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 - 0.05 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

## Element Commentary

Condition evaluation for this element includes the web faces and the top and bottom flange surfaces. Where traffic rides directly on the structural element regardless of the wearing surface evaluation of the top flange above the fillet is considered with Element # 16 – Reinforced Concrete Top Flange. The Condition State language for reinforced concrete allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.1.8 - Element #: 111 — Timber Open Girder/Beam

**Description:** This element defines all timber open girders, and is for all girders regardless of protection system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of each girder/beam.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

This element includes solid timbers, glue-lam timbers, nail-lam timbers, etc.

### 3.3.1.9 Element #: 112 — Other Open Girder/Beam

**Description:** All other material girders regardless of protection system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of each girder.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012-0.05 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The other material open girder is intended for open girders constructed of composite materials, or other materials that cannot be classified using any other defined open girder element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

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### 3.3.2 Stringers

These superstructure elements are part of a floor system, and transmit load from the deck into the floor system, such as floor beams.

### 3.3.2.1 Element #: 113 — Steel Stringer

**Description:** This element defines steel members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each stringer.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

**Element Commentary**

Condition evaluation for this element includes the web faces and the top and bottom faces of the flange. Stringers are inspected per lineal foot of stringer. This includes the top flange, web, and bottom flange. Condition State 4 refers to "warrants structural analysis..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4. For Steel Stringers with Concrete Encasement, use Element # 113 along with Element # 891 – Concrete Encasement. If all of the concrete encasement has been removed from a member, that member should not use Element # 891. If any encasement reinforcing steel is exposed or corroded, it should only be considered as it relates to the condition of the concrete encasement and not the condition of the underlying structural steel member.

### 3.3.2.2 Element #: 115 — Prestressed Concrete Stringer

**Description:** This element defines pretensioned or post-tensioned concrete members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each stringer.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004 - 0.009 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition evaluation for this element includes the web faces and the top and bottom flange surfaces.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.3.2.3 Element #: 116 — Reinforced Concrete Stringer

**Description:** This element defines mild steel reinforced concrete members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each stringer.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

The Condition State language for reinforced concrete allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.2.4 Element #: 117 — Timber Stringer

**Description:** This element defines timber members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each stringer.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

### 3.3.2.5 Element #: 118 — Other Stringer

**Description:** This element defines all other material stringers, and is for all stringers regardless of protection system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all the lengths of each stringer.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

### Element Commentary

The other material stringer is intended for stringers constructed of composite materials, or other materials that cannot be classified using any other defined stringer element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

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### 3.3.3 Trusses/Arches

These superstructure elements include materials of steel, concrete, timber, and masonry, and are the main load carrying members for the span.

### 3.3.3.1 Element #: 120 — Steel Truss

**Description:** This element defines all steel truss elements, including all tension and compression members for through and deck trusses. It is for all trusses regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	



### **Element Commentary**

Observed distress in truss vertical or diagonal members shall be reported as the length projected along the length of the truss. Trusses are inspected per lineal foot of truss. Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4. This element includes through trusses and pony trusses. For steel truss members with Concrete Encasement, use Element # 120 along with Element # 891 – Concrete Encasement. If all of the concrete encasement has been removed from a member, that member should not use Element # 891. If any encasement reinforcing steel is exposed or corroded, it should only be considered as it relates to the condition of the concrete encasement and not the condition of the underlying structural steel member.

### 3.3.3.2 Element #: 135 — Timber Truss

**Description:** This element defines all timber truss elements, including all tension and compression members for through and deck trusses. It is for all trusses regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

Observed distress in truss vertical or diagonal members shall be reported as the length projected along the length of the truss.

### 3.3.3.3 Element #: 136 — Other Truss

**Description:** This element defines all other material truss elements, including all tension and compression members, and through and deck trusses. It is for all other material trusses regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 - 0.05 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Observed distress in truss diagonal and vertical members shall be reported as the projected length along the length of the truss. The other material open truss is intended for trusses constructed of composite materials, or other materials that cannot be classified using any other defined truss element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.3.4 Element #: 141 — Steel Arch

**Description:** This element defines steel arches regardless of type, and is for all arches regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Observed distress in arch diagonals and vertical members (including spandrel columns) shall be reported as the projected length along the arch length. Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4. For steel truss members with Concrete Encasement, use Element # 120 along with Element # 891 – Concrete Encasement. If all of the concrete encasement has been removed from a member, that member should not use Element # 891. If any encasement reinforcing steel is exposed or corroded, it should only be considered as it relates to the condition of the concrete encasement and not the condition of the underlying structural steel member.

### 3.3.3.5 Element #: 142 — Other Arch

**Description:** This element defines other material arches regardless of type, and is for all other material arches regardless of protective system. It does not include arches constructed with steel, prestressed concrete, reinforced concrete, timber, and masonry or stone materials.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Cracking (RC and Other) (1130)	Width less than 0.012 in. or spacing greater than 3.0 ft. Insignificant cracks or moderate width cracks that have been sealed.	Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft. Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	Width greater than 0.05 in. or spacing of less than 1 ft. Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Observed distress in arch diagonals and verticals (including spandrel columns) shall be reported as the projected length along the arch length. The other material arch is intended for arches constructed of composite materials, or other materials that cannot be classified using any other defined arch element. For arches constructed with prestressed concrete material, use Element # 143 – Prestressed Concrete Arch. For arches constructed with reinforced concrete material, use Element # 144 – Reinforced Concrete Arch. For arches constructed with masonry or stacked stone material, use Element # 145 – Masonry Arch. For arches constructed with timber material, use Element # 146 – Timber Arch.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.3.6 Element #: 143 — Prestressed Concrete Arch

**Description:** This element defines only pretensioned or post-tensioned concrete arches, and is for all arches regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of the length of each arch panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004 – 0.009 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Observed distress in arch diagonals and vertical members (including spandrel columns) shall be reported as the projected length along the arch length. For filled arches, the arch quantity shall be measured from spring line to spring line. The length below the spring line is considered substructure.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.3.3.7 Element #: 144 — Reinforced Concrete Arch

**Description:** This element defines only mild steel reinforced concrete arches, and is for all arches regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Observed distress in arch diagonals, vertical members (including spandrel columns) and spandrel walls shall be reported as the projected length along the arch length. For filled arches, the arch quantity shall be measured from spring line to spring line. The length below the spring line is considered substructure. The Condition State language for reinforced concrete allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.3.8 Element #: 145 — Masonry Arch

**Description:** This element defines masonry or stacked stone arches, and is for all arches regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each arch section measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Observed distress in arch spandrel walls shall be reported as the projected length along the arch length. For filled arches, the arch quantity shall be measured from spring line to spring line. The length below the spring line is considered substructure.

### 3.3.3.9 Element #: 146 — Timber Arch

**Description:** This element defines only timber arches, and is for all arches regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Observed distress in arch diagonal and vertical members (including spandrel columns) shall be reported as the projected length along the arch.

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### 3.3.4 Floor Beams

These elements are the intermediate transverse load carrying members, and can be constructed from steel, concrete, and timber.

### 3.3.4.1 Element #: 152 — Steel Floor Beam

**Description:** This element defines steel floor beams that typically support stringers, and is for all floor beams regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each floor beam.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

**Element Commentary**

Condition evaluation for this element includes the web faces and the top and bottom faces of the flange. Condition State 4 refers to "warrants structural analysis..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4. For Steel Floor beam with Concrete Encasement, use Element # 152 along with Element # 891 – Concrete Encasement. If all of the concrete encasement has been removed from a member, that member should not use Element # 891. If any encasement reinforcing steel is exposed or corroded, it should only be considered as it relates to the condition of the concrete encasement and not the condition of the underlying structural steel member.

### 3.3.4.2 Element #: 154 — Prestressed Concrete Floor Beam

**Description:** This element defines prestressed concrete floor beams that typically support stringers, and is for all floor beams regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each floor beam.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004 - 0.009 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.3.4.3 Element #: 155 — Reinforced Concrete Floor Beam

**Description:** This element defines mild steel reinforced concrete floor beams that typically support stringers, and is for all floor beams regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each floor beam

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The Condition State language for reinforced concrete allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Condition State 4 refers to "warrants analysis..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.4.4 Element #: 156 — Timber Floor Beam

**Description:** This element defines timber floor beams that typically support stringers, and is for all floor beams regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each floor beam.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

None

### 3.3.4.5 Element #: 157 — Other Floor Beam

**Description:** This element defines other material floor beams that typically support stringers, and is for all floor beams regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each floor beam.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The other material floor beam is intended for floor beams constructed of composite materials, or other materials that cannot be classified using any other defined floor beam element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

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### 3.3.5 Miscellaneous Superstructure Elements

Steel pin, pin and hanger assemblies, steel gusset plates, seismic retrofit components, bridge mounted sign structures, main and secondary cables will be discussed in this section.

### 3.3.5.1 Element #: 147 — Steel Main Cables

**Description:** This element defines all steel main suspension or cable stay cables not embedded in concrete. It is for all cable groups regardless of protective systems.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the sum of all of the lengths of each main cable measured longitudinally along the travel way.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This element is intended for use on main cables in suspension bridges or main cable stays in cable stayed bridges. Suspender cables or other smaller cables shall be captured using the secondary cable element.

### 3.3.5.2 Element #: 148 — Secondary Steel Cables

**Description:** This element defines all steel suspender cables not embedded in concrete. It is for all individual or cable groups regardless of protective systems.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity for this element is the sum of the individual cable or cable groups carrying the load from the superstructure to the main cable/arch elements.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This element is intended for use on suspender cables, other smaller cables or groups of cables in one location acting as a system to carry loads from the superstructure to the main cable/arch. Suspension bridge main cables or cable stays shall be captured using the steel main cable element.

### 3.3.5.3 Element #: 149 — Other Secondary Cable

**Description:** This element defines all other material cables not embedded in concrete. It is for all individual other material cables or cable groups regardless of protective systems.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity for this element is the sum of the individual cable or cable groups carrying the load from the superstructure to the main cable/arch elements.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element is intended for use on suspender cables, other smaller cables or groups of cables in one location acting as a system to carry loads from the superstructure to the main cable/arch. Suspension bridge main cables or cable stays shall be captured using the steel main cable element. The other material secondary cable is intended for cables constructed of composite materials, or other materials that cannot be classified using any other defined cable elements.

### 3.3.5.4 Element #: 161 — Steel Pin and Pin & Hanger Assembly or both

**Description:** This element defines steel pins and pin and hanger assemblies and is for all assemblies regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity for this element is the sum of the number of pins, pin and hanger assemblies, or both.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	
				The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Distress observed on either hanger assembly plate should be considered in the condition assessment.

### 3.3.5.5 Element #: 162 — Steel Gusset Plate

**Description:** This member defines only those steel gusset plate(s) connections that are on the main truss/arch panel(s). These connections can be constructed with one or more plates that may be bolted, riveted, or welded. This element is for all gusset plates regardless of protective systems.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity for this element is the sum of the number of primary load path gusset plate assemblies. For multiple plate gusset connections at a single panel point, the quantity shall be one gusset plate regardless of the number of individual plates at the single connection point.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.



**Element Commentary**

For built-up gusset plates, distress observed on any plate should be considered in the condition assessment.

### 3.3.5.6 Agency Defined Element #: 811 — Seismic Retrofit Components

**Description:** Seismic Retrofits are designed to improve the expected seismic performance of the existing bridge through the addition of systems and components.

**Classification:** Independent ADE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity for this element is the sum of the number of retrofits installed on any component of the existing bridge.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

A range of Seismic Retrofits have been employed to improve structural performance; among them are column and pier cap enhancements (e.g., concrete, steel, or FRP shells for additional confinement, continuity and ductility), restrainers and lock-up devices (to prevent superstructure unseating), isolation bearings and hysteretic dampers (to reduce seismic response), and foundation enhancements.

For Isolation bearing, do not code Element # 811; instead code Element # 831 alone.

For Pin and Hanger Seismic retrofit, Element # 811 should be coded along with Element # 161 Steel Pin and Pin & Hanger Assembly or both.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.3.5.7 Agency Defined Element #: 812 — Bridge Mounted Sign Structures

**Description:** This element defines the sign structure attached and/or mounted on the bridge fascia.

**Classification:** Independent ADE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity for this element is the sum of the number each sign structure with separate truss attached to the existing bridge fascia.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Include comments about the signs and lighting in the field notes pages of the inspection report.

Bridge mounted signs hanging from parapet or mounted on the fascia (with an actual mounting structure), which are intended to be viewed by traffic traveling under that bridge, would be included in Element #812. Also included is any bridge-mounted sign structure (with an actual mounting structure) physically mounted to a bridge thru-truss portal, and viewable by traffic traveling on the bridge.

Overhead bridge mounted sign structures which are included in the routine Sign Structure Inspection program are not to be coded in Element # 812. For example, sign structures mounted on pier caps are reported in the Sign Structure Inspection program, and therefore not to be coded in this element.

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### 3.4 Bearings

This section covers fixed, movable, and specialty bearings.

**Note: The protective coating systems are not applicable to bearing elements with metal parts.**

### 3.4.1 Element #: 310 — Elastomeric Bearing

**Description:** This element defines only those bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

This element should be coded for expansion (moveable) or fixed bearings. For steel fixed bearings that have a small elastomeric pad code it as Element # 313 – Fixed Bearing.

Also, the Elastomeric Bearing with Teflon is included in Element 310. This bridge bearing is constructed primarily of elastomers, with or without fabric or metal reinforcement in the elastomeric pads, which have a metal sole plate with a Polytetrafluoroethylene (PTFE) sliding surface (Teflon is a brand name of the PTFE material).

### 3.4.1.1 Agency Defined Element #: 831 — Isolation Bearing

**Description:** This element defines those bridge bearings that provide for deflection and horizontal movement by the following means. They use a flexible mounting so that the period of vibration of the total system is lengthened sufficiently to reduce the force response of a seismic event. They use a damper or energy dissipater so that the relative deflections across the flexible mounting can be limited to a practical design level. They also provide rigidity under low service load levels, such as wind loads and braking forces. These bearings may be used in both fixed and expansion (moveable) applications.

**Classification:** ADE– Sub-NBE 310

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspection items for isolation bearings are essentially the same as those for plain or laminated neoprene bearings. The only elements unique to isolation bearings are the lead core and steel dowels, both of which are hidden from view and cannot be inspected. The lead core may yield during an earthquake. After a seismic event, the bearing shape and horizontal alignment in both the longitudinal and transverse direction must be closely inspected. It may be necessary to replace these bearings after an earthquake.

### 3.4.2 Element #: 311 — Movable Bearing

**Description:** This element defines only those bridge bearings which provide for both rotation and longitudinal movement by means of roller, rocker, or sliding mechanisms.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This element does not include the following types of expansion (moveable) bearings - bond breaker bearings, elastomeric bearings, pot bearings, disk bearings, spherical bearings, enclosed/concealed bearings, and isolation bearings. **The protective coating systems are not applicable to this bearing element with metal parts.**

### 3.4.2.1 Agency Defined Element #: 832 — Sliding Plate Bearings – Expansion/Moveable

**Description:** This element defines only those bridge bearings that provide for both rotational and longitudinal movement by means of plates that slide relative to each other. Longitudinal movements between the two plates is accomplished by providing slotted holes in the top (sole) plate which allows the plates to slide over each other. These bearings may be lubricated or non-lubricated. These plates may be flat in short spans (less than 50 feet in length), or concave and convex in longer spans to allow for rotation due to deflection.

**Classification:** ADE – Sub-NBE 311

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable/	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The protective coating systems are not applicable to this bearing element with metal parts.

### 3.4.2.2 Agency Defined Element #: 833 — Rocker Bearings - Expansion/Moveable

**Description:** This element defines only those bridge bearings that provide for both deflection and longitudinal movement by means of a steel plate resting on a steel pin and steel rocker, held in place by a pintle. Expansion (movement) is accomplished by allowing the location of the pin to move relative to the center of the masonry plate.

**Classification:** ADE – Sub-NBE 311

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	



**Element Commentary**

The protective coating systems are not applicable to this bearing element with metal parts.

### 3.4.3 Element #: 312 — Enclosed/Concealed Bearing

**Description:** This element defines only those bridge bearings that are enclosed so that they are not open for detailed inspection.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

**Element Commentary**

This element should be used for box girder hinges. In cases where the bearing material is not visible, the inspector shall assess the condition based on alignment, grade across the joint, persistence of debris, or other indirect indicators of the condition. Also, the potential for catastrophic failure due to reduction of bearing area because of prestress shortening should be considered when rating this element.

### 3.4.4 Element #: 313 — Fixed Bearing

**Description:** This element defines only those bridge bearings that provide for rotation only (no longitudinal movement).

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element does not include the following types of fixed bearings; elastomeric bearings, **pinned bearings**, pot bearings, disk bearings, spherical bearings, enclosed/concealed bearings, and isolation bearings. Also, the Pinned Bearing is included into Element #313. **The protective coating systems are not applicable to this bearing element with metal parts.**

### 3.4.5 Element #: 314 — Pot Bearing

**Description:** 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.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

These bearings may be used in both fixed and expansion (moveable) applications. In this type of bearing, rotation about any plane can be accommodated with a large round elastomeric disk that is confined within a thick steel ring or cylinder (the "pot"). This bearing accommodates rotations by deformations of the disk. Because the elastomer is confined, it is able to carry more load than if it was allowed to bulge out in the unconfined state. **The protective coating systems are not applicable to this bearing element with metal parts.**

### 3.4.6 Element #: 315 — Disk Bearing

**Description:** This element defines those high load bearings with a hard plastic disk. This bearing may be fixed against horizontal movement, guided to allow movement in one direction, or floating to allow sliding in any direction.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The protective coating systems are not applicable to this bearing element with metal parts.

### 3.4.6.1 Agency Defined Element #: 834 — Spherical Bearing

**Description:** This element defines only those bridge bearings that provide for both deflection and longitudinal movement by means of matching spherical surfaces in a ball-and-socket type arrangement. The bearing may be fixed against horizontal movement, guided to allow movement in one direction, or floating to allow movement in any direction. Therefore these bearings may be used in both fixed and expansion (moveable) applications.

**Classification:** ADE – Sub-NBE 315

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	<b>GOOD</b>	<b>FAIR</b>	<b>POOR</b>	<b>SEVERE</b>
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The protective coating systems are not applicable to this bearing element with metal parts.

### 3.4.7 Element #: 316 — Other Bearing

**Description:** This element defines all other material bridge bearings regardless of translation or rotation constraints.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

**Element Commentary**

The other material bearing element is intended for bearings constructed of materials that cannot be classified using any other defined bearing element. Also refer to "Bond Breaker Bearings – Expansion/Moveable", Sub-element No. 833. **The protective coating systems are not applicable to this bearing element with metal parts.**

### 3.4.7.1 Agency Defined Element #: 835 — Bond Breaker Bearing – Expansion/Moveable

**Description:** This element defines only those bridge bearings that provide for longitudinal movement by means of membrane such as oil-soaked felt or tar paper that separates a concrete bridge seat from the concrete stringer or slab it supports. These bearings are used primarily for short spans and are not designed to allow for rotation caused by deflection.

**Classification:** ADE – Sub-NBE 316

**Units of Measurement:** Each

**Quantity Calculation:** The quantity is the sum of each bearing of this type.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This type of bearing is inspected by examining the area at the interface between the superstructure and substructure.

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### **3.5 Substructure Elements**

Substructure elements described in this Article transmit the load from the superstructure into the ground. These elements include columns, piles, pile caps/footings, pile extension, pier/bent caps, pier walls, and abutments. These elements include elements of steel, concrete, timber, masonry, and other materials.

#### **3.5.1 Columns/Pier Walls**

This Article covers supporting elements of the structure. These items include columns and pier walls.

### 3.5.1.1 Element #: 202 — Steel Column

**Description:** All steel columns regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of columns.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4.

### 3.5.1.2 Element #: 203 — Other Column

**Description:** All other material columns regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of columns.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The other material column is intended for columns constructed of composite materials, or other materials that cannot be classified using any other defined column elements.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.1.3 Element #: 204 — Prestressed Concrete Column

**Description:** All prestressed concrete columns regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of columns.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004-0.009 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars or Prestressing strands are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.5.1.4 Element #: 205 — Reinforced Concrete Column

**Description:** All reinforced concrete columns regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of columns.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.1.5 Element #: 206 — Timber Column

**Description:** All timber columns regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of columns.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

None

### 3.5.1.6 Element #: 207 — Steel Tower

**Description:** Steel built-up or framed tower supports regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the heights of built-up or framed tower supports.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element is intended to be used for truss framed tower supports or built-up steel towers. It is intended to capture large supports and towers associated with suspension bridges, cable stayed bridges, movable bridges, or similar structural configurations. Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4.

### 3.5.1.7 Element #: 208 — Timber Trestle

**Description:** Framed timber supports. For all timber trestle/towers regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the heights of built-up or framed tower supports.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element is intended to be used for truss framed trestle or towers. It is intended to capture large supports and towers associated with large deck truss bridges.

### 3.5.1.8 Element #: 210 — Reinforced Concrete Pier Wall

**Description:** Reinforced concrete pier walls regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the lengths of the pier walls measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.1.9 Element #: 211 — Other Pier Wall

**Description:** Those pier walls of other materials regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the lengths of the pier walls measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 - 0.05 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element should be coded for pier walls constructed of other materials not otherwise defined.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.1.10 Element #: 212 — Timber Pier Wall

**Description:** Those timber pier walls that include pile, timber sheet material, and filler. For all pier walls regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the lengths of the pier walls measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

None

### 3.5.1.11 Element #: 213 — Masonry Pier Wall

**Description:** Those pier walls constructed of block or stone. The block or stone may be placed with or without mortar. For all pier walls regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the lengths of the pier walls measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

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### **3.5.2 Abutments/ Slope Protection/ Wingwalls/ Headwalls**

This Article covers the abutment elements of the structure. Abutments may be constructed of steel, concrete, masonry, and other materials. Slope protection, wingwalls and headwalls are also included in this section.

### 3.5.2.1 Element #: 215 — Reinforced Concrete Abutment

**Description:** Reinforced concrete abutments, including the material retaining the embankment and monolithic wingwalls and abutment extensions. For all reinforced concrete abutment regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the width of the abutment with monolithic wingwalls and abutment extensions measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Monolithic wingwalls, up to the first construction joint (cold joint, water stop, etc.) shall be considered in the quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element. Condition State 4 refers to “warrants structural review...” Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.2 Element #: 216 — Timber Abutment

**Description:** Timber abutments, including the sheet material retaining the embankment, integral wingwalls, and abutment extensions. For all abutments regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Monolithic wingwalls, up to the first construction joint (Plank butt joint, etc.) shall be considered in this quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element.

### 3.5.2.3 Element #: 217 — Masonry Abutment

**Description:** Those abutments constructed of block or stone, including integral wingwalls and abutment extensions. The block or stone may be placed with or without mortar. For all abutments regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Integral wingwalls, up to the first construction joint (cold joint, water stop, etc.) shall be considered in the quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element.

### 3.5.2.4 Element #: 218 — Other Abutment

**Description:** Other material abutment systems, including the sheet material retaining the embankment, and integral wingwalls and abutment extensions. For all abutments regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

This element should be coded for abutments constructed of materials not otherwise defined.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.5 Element #: 219 — Steel Abutment

**Description:** Steel abutments, including the sheet material retaining the embankment, and monolithic wingwalls and abutment extensions. For all abutments regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of columns.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Monolithic wingwalls, up to the first construction joint (sheet pile joint, etc.), shall be considered in the quantity and assessment of the abutment element. Wingwalls that are not monolithic with the abutment shall not be included in the quantity or assessment of the abutment element.

### 3.5.2.6 Agency Defined Element #: 841 — Slope Protection

**Description:** This element defines the slope (embankment or fill) protection under the bridge.

**Classification:** Independent ADE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of slope protections.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1-in. or less deep or 6-in. or less in-diameter. Patched-area that is sound.	Spall greater than 1 in. deep or greater than 6-in. diameter. Patched-area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (RC and Other) (1130)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width greater than 0.05 in. or spacing of less than 1 ft.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Erosion / Undermining (Slope Protection) (8001)	None.	Exists within tolerable limits or has been arrested with effective drainage system.	Exceeds tolerable limits but is less than the critical limits determined by slope stability evaluation and does not warrant geotechnical or structural review.	The condition warrants a geotechnical and/or geotechnical review to determine the effect on strength or serviceability of the element or bridge;
Cracking/ Displacement/ Missing Mortar/ Broken slab (Slope Protection) (8005)	Insignificant defects or moderate width cracks that have been sealed.	Unsealed moderate width cracks or displacement/ missing mortar/ broken slab affecting less than one-third of the area.	Unsealed severe width cracks or displacement/ missing mortar/ broken slab affecting more than one-third of the area.	OR a geotechnical and/or structural review has been completed and the defects impact strength or serviceability of the element or bridge.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.7 Agency Defined Element #: 842 — Reinforced Concrete Wingwall

**Description:** Reinforced concrete non-monolithic wingwall, including the material retaining the embankment. For all reinforced concrete non-monolithic wingwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the non-monolithic wingwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.8 Agency Defined Element #: 843 — Timber Wingwall

**Description:** Timber non-monolithic wingwall. For all wingwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the non-monolithic wingwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

None

### 3.5.2.9 Agency Defined Element #: 844 — Masonry Wingwall

**Description:** Those non-monolithic wingwalls that are constructed of block or stone. The block or stone may be placed with or without mortar. For all wingwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the non-monolithic wingwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

In all cases, masonry wingwalls are to be considered non-integral.

### 3.5.2.9 Agency Defined Element #: 845 — Other Wingwall

**Description:** Other material wingwall systems, including the material retaining the embankment. For all wingwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the non-monolithic wingwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.10 Agency Defined Element #: 846 — Reinforced Concrete Headwall

**Description:** Reinforced concrete headwall, including the material retaining the embankment. For all reinforced concrete headwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the headwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.11 Agency Defined Element #: 847 — Masonry Headwall

**Description:** Those headwalls that are constructed of block or stone. The block or stone may be placed with or without mortar. For all headwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the non-monolithic headwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

### 3.5.2.12 Agency Defined Element #: 848 — Other Headwall

**Description:** Other material headwall systems, including the material retaining the embankment. For all headwalls regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of the headwall.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.2.13 Agency Defined Element #: 849 — Fender System

**Description:** This element covers Fender System of any material regardless of protective system, if any.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the count of each Fender System.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

For additional clarification, see appendix A5.

### 3.5.2.14 Agency Defined Element #: 850 — Bulkhead

**Description:** This section is for bulkhead constructed of any material, including the material retaining the embankment, regardless of protective system.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of all bulkheads.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

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### **3.5.3 Piles/Pier Caps/Footings**

This Article covers pilings, pier caps, and footings of all materials.

### 3.5.3.1 Element #: 220 — Reinforced Concrete Pile Cap/Footing

**Description:** Reinforced concrete pile caps/footings that are visible for inspection, including pile caps/footings exposed from erosion or scour or visible during an underwater inspection. The exposure may be intentional or caused by erosion or scour.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the length of footings or pile caps along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.3.2 Element #: 225 — Steel Pile

**Description:** Steel piles that are visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection. For all steel piles regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of piles visible for inspection.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." For this condition code, if a steel member has 10% or more section loss, consider that member to be in Condition State 4.

### 3.5.3.3 Element #: 226 — Prestressed Concrete Pile

**Description:** Prestressed concrete piles that are visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection. For all prestressed concrete piles regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of piles visible for inspection.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004 – 0.009 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars or Prestressing strands are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.5.3.4 Element #: 227 — Reinforced Concrete Pile

**Description:** Reinforced concrete piles that are visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection. For all reinforced concrete piles regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of piles visible for inspection.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars or Prestressing strands are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.3.5 Element #: 228 — Timber Pile

**Description:** Timber piles that are visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection. For all timber piles regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of piles visible for inspection.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

None

### 3.5.3.6 Element #: 229 — Other Pile

**Description:** Other material piles that is visible for inspection, including piles exposed from erosion or scour and piles visible during an underwater inspection. For all other material piles regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the number of piles visible for inspection.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination /Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence /Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 – 0.05 in. or spacing of 1.0 – 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

### Element Commentary

The other material pile element is intended for piles constructed of composite materials, or other materials that cannot be classified using any other defined pile element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.3.7 Element #: 231 — Steel Pier Cap

**Description:** Those steel pier caps that support girders and transfer load into piles or columns. For all steel pier caps regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the cap lengths measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Condition State 4 refers to "warrants structural review..."For this condition code, if a steel member has 10% or more section loss, consider that portion to be in Condition State 4.

### 3.5.3.8 Element #: 233 — Prestressed Concrete Pier Cap

**Description:** Those prestressed concrete pier caps that support girders and transfer load into piles or columns. For all caps regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the cap lengths measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004–0.009 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars or Prestressing strands are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

### 3.5.3.9 Element #: 234 — Reinforced Concrete Pier Cap

**Description:** Those reinforced concrete pier caps that support girders and transfer load into piles or columns. For all pier caps regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the cap lengths measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss but does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012 - 0.05 in. or spacing of 1.0 - 3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	

### **Element Commentary**

Condition State 4 refers to "warrants structural review..." Guidelines for meeting this condition are when reinforcing bars are exposed and there is greater than 10% section loss of the steel.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.5.3.10 Element #: 235 — Timber Pier Cap

**Description:** Those timber pier caps that support girders that transfer load into piles or columns. For all timber pier caps regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the cap lengths measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5%-50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack that has not been arrested but does not warrant structural review.	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth but does not warrant structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

### 3.5.3.11 Element #: 236 — Other Pier Cap

**Description:** Other material pier caps that support girders that transfer load into piles or columns. For all other material pier caps regardless of protective system.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the cap lengths measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust Staining.	Heavy build-up with rust staining.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Cracking (RC and Other) (1130)	Width less than 0.012 in. or spacing greater than 3.0 ft. Insignificant cracks or moderate width cracks that have been sealed.	Width 0.012-0.05 in. or spacing of 1.0-3.0 ft. Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	Width greater than 0.05 in. or spacing of less than 1 ft. Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The other material pier cap element is intended for pier caps constructed of composite materials, or other materials that cannot be classified using any other defined pier cap element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

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## 3.6 Culverts

This section covers steel, prestressed and reinforced concrete, timber, masonry, and other types of culverts.

### 3.6.1 Element #: 240 — Steel Culvert

**Description:** This element defines steel culverts, including arched, round, or elliptical pipes.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the flow line length of the barrel times the number of barrels.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state. Wingwalls or headwalls are not included in this element.

### 3.6.2 Element #: 241 — Reinforced Concrete Culvert

**Description:** This element defines reinforced concrete culverts, including box, arched, round, or elliptical shapes.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the flow line length of the barrel times the number of barrels.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state. The Condition State language for reinforced concrete allows "superficial cracking". These cracks are the small hairline cracks which often are evident even in new concrete. Wingwalls or headwalls are not included in this element. If a joint determines the controlling element, report the number of lineal feet of one culvert section at the appropriate Condition State.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.6.3 Element #: 242 — Timber Culvert

**Description:** This element defines all timber culverts.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the flow line length of the barrel times the number of barrels.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness	Section loss 10% or more of the member thickness but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state. Wingwalls or headwalls are not included in this element. If fasteners are the controlling element, estimate the percentage of connections in each Condition State and use the corresponding percentage of total lineal feet for measurement.

### 3.6.4 Element #: 243 — Other Culvert

**Description:** Other material-type culverts, including arches, round, or elliptical pipes. These culverts are not included in steel, concrete or timber material types.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the flow line length of the barrel times the number of barrels.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state. Wingwalls or headwalls are not included in this element.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.6.5 Element #: 244 — Masonry Culvert

**Description:** This element defines masonry block or stone culverts.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the flow line length of the barrel times the number of barrels.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the of joints	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Area (Masonry) (1630)	None.	Sound Patch	Unsound Patch	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

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

### 3.6.6 Element #: 245 — Prestressed Concrete Culvert

**Description:** This element defines prestressed concrete culverts.

**Classification:** AASHTO NBE

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is the flow line length of the barrel times the number of barrels.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004-0.009 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

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

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

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### 3.7 Joints

This section covers expansion joints, pourable joints, compression joints, and assembly joints.

### 3.7.1 Element #: 300 — Strip Seal Expansion Joint

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

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion.	Complete loss of adhesion.
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking (2340)	None.	Surface crack.	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State 2.

### 3.7.1.1 Agency Defined Element #: 861 — Elastomeric Flex-Type Joint

**Description:** This element defines those joints made of elastomeric seal assemblies which are bolted down to the supports. These joints may or may not be armored.

**Classification:** ADE – Sub-BME 300

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion	Complete loss of adhesion
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking (2340)	None.	Surface crack	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State.

### 3.7.2 Element #: 301 — Pourable Joint Seal

**Description:** This element defines those joints filled with a pourable seal with or without a backer.

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion	Complete loss of adhesion
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking (2340)	None.	Surface crack	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State 2.

### 3.7.3 Element #: 302 — Compression Joint Seal

**Description:** This element defines only those joints filled with a preformed compression type seal. This joint may or may not have an anchor system to confine the seal.

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion	Complete loss of adhesion.
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking (2340)	None.	Surface crack.	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State 2.

### 3.7.4 Element #: 303 — Assembly Joint with Seal

**Description:** This element defines only those joints filled with an assembly mechanism that has a seal.

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion	Complete loss of adhesion.
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking (2340)	None.	Surface crack.	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

Evidence of mechanism failures, such as loose or broken springs, bolts, or support bars shall be coded as Condition State 3. Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State 2. Modular Expansion Joints are included in Element # 303.

### 3.7.5 Element #: 304 — Open Expansion Joint

**Description:** This element defines only those joints that are open and not sealed.

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This element is intended for joints designed as open joints not those joints that were designed to have a seal that is currently missing. Approach slab expansion joints are not included in this element.

### 3.7.6 Element #: 305 — Assembly Joint without Seal

**Description:** This element defines only those assembly joints that are open and not sealed. This includes finger and sliding plate joints.

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This element shall include open joints with or without a drainage trough below the joint. Evidence of mechanism failures, such as loose or broken springs, bolts, or support bars shall be coded as Condition State 3. Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State 2.

### 3.7.7 Element #: 306 — Other Joint

**Description:** This element defines only those other joints that are not defined by any other joint element.

**Classification:** AASHTO BME

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning.	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

The other material joint element is intended for joints constructed of materials that cannot be classified using any other defined joint element. Approach slab expansion joints are not included in this element. If a joint is not visible due to an asphalt overlay, code it in Condition State 2.

### 3.7.7.1 Agency Defined Element #: 862 — Asphaltic Plug Expansion Device

**Description:** This element defines only those joints that are constructed of layers of rubberized asphalt leaving no actual opening in the driving surface.

**Classification:** ADE – Sub-BME 306

**Units of Measurement:** ft.

**Quantity Calculation:** The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.
Delamination / Spall/ Patched Area/Pothole (Wearing Surface) (3210)	None.	Delaminated. Spall less than 1 in. deep or less than 6 in. diameter. Patched area that is sound. Partial depth pothole.	Spall 1 in. deep or greater or 6 in. diameter or greater. Patched area that is unsound or showing distress. Full depth pothole.	The wearing surface is no longer effective.
Crack (Wearing Surface) (3220)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width greater than 0.05 in. or spacing of less than 1 ft.	The wearing surface is no longer effective.



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

Approach slab expansion joints are not included in this element.

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### **3.8 Wearing Surfaces, Protective Coatings, and Concrete Reinforcing Steel Protective Systems**

The elements in this section are wearing surfaces, steel and concrete protective coatings, and concrete reinforcing steel protection systems such as cathodic protection. These systems will influence the deterioration and condition of the underlying structural element.

### 3.8.1 Element #: 510 — Wearing Surfaces

**Description:** This element is for all decks/slabs that have overlays made with flexible (asphaltic concrete), semi rigid (epoxy and polyester material), rigid (Portland Cement) materials and timber running planks.

**Classification:** AASHTO BME

**Units of Measurement:** sq.ft.

**Quantity Calculation:** The quantity for this element should include the area of the deck/slab that is protected by this wearing surface.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/Spall/Patched Area/Pothole (Wearing Surfaces) (3210)	None.	Delaminated. Spall less than 1 in. deep or less than 6 in. diameter. Patched area that is sound. Partial depth pothole.	Spall 1 in. deep or greater or 6 in. diameter or greater. Patched area that is unsound or showing distress. Full depth pothole.	The wearing surface is no longer effective.
Crack (Wearing Surface) (3220)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width of more than 0.05 in. or spacing of less than 1.0 ft.	
Effectiveness (Wearing Surface) (3230)	Fully effective. No evidence of leakage or further deterioration of the protected element.	Substantially effective. Deterioration of the protected element has slowed.	Limited effectiveness. Deterioration of the protected element has progressed.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

### 3.8.2 Element #: 515 — Steel Protective Coating

**Description:** The element is for steel elements that have a protective coating such as paint, galvanization, weathering steel patina or other top coat steel corrosion inhibitor.

**Classification:** AASHTO BME

**Units of Measurement:** sq.ft. (surface)

**Quantity Calculation:** This quantity for this element should include the entire protected surface of the steel element.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Chalking (Steel Protective Coatings) (3410)	None.	Surface Dulling.	Loss of Pigment.	Not Applicable.
Peeling/ Bubbling/ Cracking (Steel Protective Coatings) (3420)	None.	Finish coats only.	Finish and primer coats.	Exposure of bare metal.
Oxide Film Degradation Color/ Texture Adherence (Steel Protective Coatings) (3430)	Yellow-orange or light brown for early development. Chocolate-brown to purple-brown for fully developed. Tightly adhered, capable of withstanding hammering or vigorous wire brushing.	Granular texture.	Small flakes, less than 1/2 in. diameter.	Dark black color. Large flakes, 1/2 in. diameter or greater or laminar sheets or nodules.
Effectiveness (Steel Protective Coatings) (3440)	Fully effective.	Substantially effective.	Limited effectiveness.	Failed, no protection of the underlying metal.

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

#### Element Commentary

This element shall describe all coating systems. This includes paint systems, oxide on weathering steel, and galvanization. Assess protective coatings based upon the defects that would apply.

This element requires coding of painted (or other coated) elements based on their exposed surface areas in square feet.

One of purpose of coding this element is to include a factor in the prediction model for BMS which will reduce the deterioration rate for elements with protective coating than those without any coating.

This element is not to be used for estimating painting contracts which would assume a level of accuracy that would not be realistic. For example, this element is not useful in estimating quantities for painting needs because it would not include the diaphragms, cross frames, and other non-primary load carrying elements, and usually the units are in tons and not square feet.

### 3.8.3 Element #: 521 — Concrete Protective Coating

**Description:** The element is for concrete elements that have a protective coating applied to them. These coatings include silane/siloxane water proofers, crack sealers such as High Molecular Weight Methacrylate (HMWM), or any top coat barrier that protects concrete from deterioration and reinforcing steel from corrosion.

**Classification:** AASHTO BME

**Units of Measurement:** sq. ft.

**Quantity Calculation:** This quantity for this element should include the entire protected surface of the steel element.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Wear (Concrete Protective Coatings) (3510)	None.	Underlying concrete not exposed; coating showing wear from UV exposure; friction course missing.	Underlying concrete is not exposed; thickness of the coating is reduced.	Underlying concrete exposed. Protective coating no longer effective.
Effectiveness (Concrete Protective Coatings) (3540)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.



**Element Commentary**

None

### 3.8.4 Element #: 520 — Concrete Reinforcing Steel Protective System

**Description:** This element defines all types of protective systems used to protect reinforcing steel in concrete elements from corrosion.

**Classification:** AASHTO BME

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element should include the entire surface area of the protected element.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Effectiveness - Protective System (e.g. cathodic) (3600)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

This protection system element is intended to capture situations where the concrete element may be expected to deteriorate at a rate that is slower than unprotected situations. Protection systems may include rebar coatings, cathodic protection, or other similar protection methods. This element includes epoxy coated, galvanized, and stainless steel reinforcement. Wearing surfaces are addressed under the appropriate wearing surface element and not this element.

### 3.8.5 Agency Defined Element #: 891 — Concrete Encasement

**Description:** This element defines Concrete Encasement that may be on steel girders, stringers, floor beams, truss members or any other superstructure or substructure element.

**Classification:** Independent ADE

**Units of Measurement:** ft.

**Quantity Calculation:** Sum of the lengths of the concrete encased members.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination /Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The encased steel member is to be coded consistent with the Condition State of the Concrete Encasement for the following defects: Delamination/ Spall/ Patched Area (1080), Efflorescence/ Rust Staining (1120) and Cracking (1130). For other defects that are not indicative of any distress to the underlying steel, the Condition State would typically not be reduced.

This element is to be coded in linear feet along with the parent element that would be used to calculate the quantity.

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

### 3.8.6 Agency Defined Element #: 892 — Bridge Drainage

**Description:** This element defines Bridge Drainage units installed on deck and/or superstructure that include inlets, down sprouts, etc.

**Classification:** Independent ADE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of all bridge drainage units.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.
Clogging (Bridge Drainage) (8002)	None.	Minimal. Inlets and pipes clogged for less than 10% area. No water accumulation.	Moderate. Not more than 25% area clogged in inlets and pipes. No water accumulation. Does not warrant bridge drainage review.	Failed. 100% area of inlets and pipes clogged. Water accumulation is present. The condition warrants detailed review of Bridge Drainage System.
Leakage (Bridge Drainage) (8003)	None.	Minimal. Minor dripping through the down spouts or pipes without damaging the primary member.	Moderate. More than a drip and less than free flow of water through down spouts, pipes or joints without damaging the primary member.	Failed. Water leakage is damaging the primary member. The condition warrants detailed review of the Bridge Drainage System.

**Element Commentary**

None

### 3.8.7 Agency Defined Element #: 893 — Temporary Support Structures

**Description:** This element defines temporary support structures installed on the bridge.

**Classification:** Independent ADE

**Units of Measurement:** Each

**Quantity Calculation:** Sum of the count of all temporary support structures.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self- arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

**Element Commentary**

None

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### 3.9 Approach Slabs

This section will cover bridge approach slabs. These slabs will be constructed with concrete and mild or prestressed (post-tension) reinforcement. Approach slabs are Bridge Management Elements (BMEs) and are not included in the standard set of National Bridge Elements.

**Note: There is no element for Approach Pavement, and it is not coded under any of the Approach Slabs Elements.**

### 3.9.1 Element #: 320 — Prestressed Concrete Approach Slab

**Description:** This element defines those structural sections, between the abutment and the approach pavement that are constructed of prestressed (post-tensioned) reinforced concrete.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** The quantity for this element should include the area of the approach slab(s) from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004–0.009 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

Element #320 – Prestressed Concrete Approach Slab must be coded in accordance with the bridge construction plans/field measurements or 25' length, whichever is less, multiplied by the total width. Additionally, Element #510 – Wearing Surface can be coded with an equivalent quantity.

### 3.9.2 Element #: 321 — Reinforced Concrete Approach Slab

**Description:** Those structural sections between the abutment and the approach pavement that are constructed of mild steel reinforced concrete.

**Classification:** AASHTO NBE

**Units of Measurement:** sq. ft.

**Quantity Calculation:** Should include the area of the approach slab(s) from edge to edge including any median areas and accounting for any flares or ramps present.

#### Condition State Definitions

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### Element Commentary

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

Element #321 – Reinforced Concrete Approach Slab must be coded in accordance with the bridge construction plans/field measurements or 25' length, whichever is less, multiplied by the total width. Additionally, Element #510 – Wearing Surface can be coded with an equivalent quantity.

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### 3.10 Environmental Factors (Service Conditions)

Elements exposed to different environmental factors and service conditions deteriorate differently. These factors may include:

- Operational activities from traffic volumes and truck movements,
- Exposure to water, road salt, and other corrosive materials,
- Condition of protective and water proofing systems, or
- Temperature extremes, either from nature or human activity.

When inventorying and assessing the condition of the elements, an inspector should consider the environment in which the element is operating. The environment designation of an element can change over time; as it would, for example, if operating policies were changed to reduce the use of road salt. However, by definition, the environment designation for any element cannot change as the result of maintenance work or deterioration.

Environment	Description
<b>1—Benign</b>	Neither environmental factors nor operating practices are likely to significantly change the condition of the element over time, or their effects have been mitigated by the presence of highly effective protective systems. <b>Not used in New Jersey.</b>
<b>2—Low</b>	Environmental factors, operating practices, or both either do not adversely influence the condition of the element, or their effects are substantially lessened by the application of effective protective systems. <b>Not used in New Jersey.</b>
<b>3—Moderate</b>	Any change in the condition of the element is likely to be quite normal as measured against the environmental factors, operating practices, or both that are considered typical by the agency. <b>Used for typical environment in New Jersey.</b>
<b>4—Severe</b>	Environmental factors, operating practices, or both, contribute to the rapid decline in the condition of the element. Protective systems are not in place or are ineffective. <b>Used for severe environmental conditions in New Jersey such as saltwater (marine), brackish water (part saltwater) or industrial.</b>

Examples of factors that could increase the severity of the environment rating for various types of elements may include any of the following. The inspector would record the predominant environment factor affecting an element.

Element	Example Environmental Factors
Timber Elements	High moisture content
	Pest infestation
	Ice flow impacts
Steel Elements	Distance from salt air
	Water wet/dry cycles
	Exposure to corrosive soils and liquids
Concrete Elements	Freeze-thaw cycles
	Tire chain wear
	Deck salting
Petroleum Based	High temperatures
Joints and Bearings	Extreme temperature ranges
Operating Practices	High traffic and/or truck volume

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## Appendix A —NJDOT Developed ADEs

### A1 NJDOT Developed AASHTO ADEs

The following table summarizes the NJDOT Developed Elements (AASHTO ADEs) that are either created new or converted from CoRe Elements:

CoRe ADEs	CoRe Element Name	CoRe Element Type	ADEs	Units	AASHTO 2013 ADE Name	AASHTO 2013 ADE Type
501	Curbs/Sidewalks - Steel - Unpainted	Non-CoRe	<b>801</b>	LF	Curbs/Sidewalks - Steel	Independent
502	Curbs/Sidewalks - Steel - Painted	Non-CoRe	<b>801</b>	LF	Curbs/Sidewalks - Steel	Independent
503	Curbs/Sidewalks - Concrete	Non-CoRe	<b>802</b>	LF	Curbs/Sidewalks - Concrete	Independent
504	Curbs/Sidewalks – Timber	Non-CoRe	<b>803</b>	LF	Curbs/Sidewalks - Timber	Independent
<b>(new)</b>			<b>804</b>	LF	Curbs/Sidewalks - Other	Independent
<b>(new)</b>			<b>805</b>	LF	Sound barrier wall on/attached to Structure	Independent
<b>(new)</b>			<b>811</b>	EA	Seismic Retrofit Components	Independent
<b>(new)</b>			<b>812</b>	EA	Bridge Mounted Sign Structures	Independent
520	Isolation Bearing	Non-CoRe	<b>831</b>	EA	Isolation Bearing	Sub-element of NBE 310
372	Sliding Plate Bearing - Expansion/Moveable	Sub CoRe 311	<b>832</b>	EA	Sliding Plate Bearing - Expansion/Moveable	Sub-element of NBE 311
374	Rocker Bearing - Expansion/Moveable	Sub CoRe 311	<b>833</b>	EA	Rocker Bearing - Expansion/Moveable	Sub-element of NBE 311
376	Spherical Bearing	Sub CoRe 315	<b>834</b>	EA	Spherical Bearing	Sub-element of NBE 315
373	Bond Breaker Bearing - Expansion/Moveable	Sub CoRe 311	<b>835</b>	EA	Bond Breaker Bearing - Expansion/Moveable	Sub-element of NBE 316
505	Slope Protection	Non-CoRe	<b>841</b>	EA	Slope Protection	Independent
506	Wingwalls - Abutment - Concrete, Masonry, and Timber	Non-CoRe	<b>842</b>	LF	Wingwalls - Reinforced Concrete	Independent
508	Wingwalls - Culvert - Concrete, Masonry, and Timber	Non-CoRe	<b>842</b>	LF	Wingwalls - Reinforced Concrete	Independent

<b>CoRe ADEs</b>	<b>CoRe Element Name</b>	<b>CoRe Element Type</b>	<b>ADEs</b>	<b>Units</b>	<b>AASHTO 2013 ADE Name</b>	<b>AASHTO 2013 ADE Type</b>
506	Wingwalls - Abutment - Concrete, Masonry, and Timber	Non-CoRe	<b>843</b>	LF	Wingwalls - Timber	Independent
508	Wingwalls - Culvert - Concrete, Masonry, and Timber	Non-CoRe	<b>843</b>	LF	Wingwalls - Timber	Independent
506	Wingwalls - Abutment - Concrete, Masonry, and Timber	Non-CoRe	<b>844</b>	LF	Wingwalls - Masonry	Independent
508	Wingwalls - Culvert - Concrete, Masonry, and Timber	Non-CoRe	<b>844</b>	LF	Wingwalls - Masonry	Independent
<b>(new)</b>			<b>845</b>	LF	Wingwalls - Other	Independent
507	Headwalls - Other - Concrete and Masonry	Non-CoRe	<b>846</b>	LF	Headwalls - Reinforced Concrete	Independent
509	Headwalls - Culvert - Concrete and Masonry	Non-CoRe	<b>846</b>	LF	Headwalls - Reinforced Concrete	Independent
507	Headwalls - Other - Concrete and Masonry	Non-CoRe	<b>847</b>	LF	Headwalls - Masonry	Independent
509	Headwalls - Culvert - Concrete and Masonry	Non-CoRe	<b>847</b>	LF	Headwalls - Masonry	Independent
<b>(new)</b>			<b>848</b>	LF	Headwalls - Other	Independent
<b>(new)</b>			<b>849</b>	EA	Fender System	Independent
<b>(new)</b>			<b>850</b>	LF	Bulkhead	Independent
305	Elastomeric Flex-Type Joint	Sub CoRe 300	<b>861</b>	LF	Elastomeric Flex-Type Joint	Sub-element of NBE 300
306	Asphaltic Plug Expansion Joint		<b>862</b>	LF	Asphaltic Plug Expansion Joint	Sub-element of NBE 306
<b>(new)</b>			<b>891</b>	LF	Concrete Encasement	Independent
<b>(new)</b>			<b>892</b>	EA	Bridge Drainage	Independent

## A2 NJDOT Dropped CoRe ADEs

The following table shows NJDOT Agency Developed Elements that are dropped from CoRe 2003 ADEs in *Pontis Element Level Coding Guide*:

<b>Dropped CoRe ADE</b>	<b>CoRe Element Name</b>	<b>CoRe Element Type</b>	<b>Remarks</b>
070	Concrete Deck - Protected w/ membrane, AC overlay, and coated bars - cast-in-place	Sub-element of CoRe 014	<b>Moved to NBE 12</b>
071	Concrete Deck - Protected w/ membrane, AC overlay, and coated bars - precast	Sub-element of CoRe 014	<b>Moved to NBE 13</b>
073	Concrete Deck - Protected w/ thin overlay and coated bars - cast-in-place	Sub-element of CoRe 018	<b>Moved to NBE 12</b>
074	Concrete Deck - Protected w/ thin overlay and coated bars - precast	Sub-element of CoRe 018	<b>Moved to NBE 13</b>
076	Concrete Deck - Protected w/ coated bars and rigid overlay - cast-in-place	Sub-element of CoRe 026	<b>Moved to NBE 12</b>
077	Concrete Deck - Protected w/ coated bars and rigid overlay - precast	Sub-element of CoRe 026	<b>Moved to NBE 13</b>
170	Open Girder - Concrete Encased Steel	Sub-element of CoRe 107	<b>Use ADE 891 along with NBE 107</b>
171	Stringer - Concrete Encased Steel	Sub-element of CoRe 113	<b>Use ADE 891 along with NBE 113</b>
172	Through Truss - Bottom Chord - Concrete Encased Steel	Sub-element of CoRe 121	<b>Use ADE 891 along with NBE 120</b>
173	Arch - Concrete Encased Steel	Sub-element of CoRe 141	<b>Use ADE 891 along with NBE 141</b>
174	Floor beam - Concrete Encased Steel	Sub-element of CoRe 152	<b>Use ADE 891 along with NBE 152</b>
175	Deck Truss - Concrete Encased Steel	Sub-element of CoRe 131	<b>Use ADE 891 along with NBE 120</b>
270	Column or Pile Extension - Concrete Encased Steel	Non-CoRe	<b>Use ADE 891 along with NBE 202</b>
271	Pier Cap - Concrete Encased Steel	Non-CoRe	<b>Use ADE 891 along with NBE 231</b>
370	Elastomeric Bearing with Teflon	Sub-element of CoRe 310	<b>Moved to NBE 310</b>
375	Pinned Bearing - Fixed	Sub-element of CoRe 313	<b>Moved to NBE 313</b>
307	Modular Expansion Joint	Sub-element of CoRe 300	<b>Moved to NBE 303</b>
500	Deterioration of Pin & Hanger Assembly (for Superstructure Elements)	Non-CoRe	<b>Moved to 161</b>
521	Bearing - Other	Non-CoRe	<b>Moved to NBE 316</b>

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### A3 Additional Guidance on Sound Barrier on/attached to Bridge ADE # 805

The following guidance was taken from Noise Barrier Design Handbook posted on FHWA website at [http://www.fhwa.dot.gov/environment/noise/noise\\_barriers/design\\_construction/design/design04.cfm](http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/design/design04.cfm)

Placing a new noise wall on an existing bridge adds a significant amount of stress on a structure caused by the additional weight and rotational loading for which the existing structure may not have been originally designed. This may result in the need to add additional girders, beams, and diaphragms; strengthen the existing bridge deck; or modify the existing parapet. Additional solutions which should be considered are reducing the weight of the noise wall by using light weight material or, only if absolutely necessary, by reducing the height of the wall or, ultimately, eliminating the construction of the wall. The latter should only be considered under absolutely severe situations.

Besides the obvious additional costs of such structural modifications (above the noise wall cost), other issues related to modifying an existing bridge include:

- Maintenance;
- Protection of traffic (both on and beneath bridge);
- Accessibility to areas requiring modifications;
- Bridge vibrations due to existing traffic;
- Vibrations from construction operations; and
- Potential environmental mitigation measures (related to painting beams or working over waterways or wetland areas).

While additional costs are still incurred (compared to the same bridge without a noise barrier), the ability to design the noise wall as an integral part of the overall structure addresses most if not all of the loading and traffic-related concerns discussed above.

The proximity of the noise wall to the traveled portion of the bridge usually makes the wall considerably more susceptible to damage (compared to most ground-mounted noise walls). Such damage may be caused by vehicle impact, airborne debris such as stones, vehicle parts, snow removal operations, or material from salt spreaders in areas subject to snow fall.

Factors considered in addressing this concern include:

- Type and proximity of land use adjacent to or beneath the noise wall;
- Location of the noise wall on the bridge;
- Noise wall-to-bridge attachment details;
- Weight, composition, and shatterability of the noise wall component parts; and
- Any mechanisms (either internal or external to the noise wall) designed to retain noise wall components.

While these factors are typically considered by the noise wall designers, the degree of consideration can vary significantly during the decision-making process. The use of barrier materials which tear (such as metal) rather than break/shatter into pieces should be considered this process.

The proximity of bridge-mounted noise walls to traffic has raised concerns related to issues such as vehicular sight distance, barrier shading which increases potential for highway icing, and adverse effects on highway lighting. These issues are discussed elsewhere in this document.



Snow drifting and storage implications, restrictions to bridge inspection teams using bucket trucks to inspect beams, and maintenance of the noise wall itself including graffiti removal, noise barrier and structure damage repair, repainting, etc., are some of the concerns which should be considered during all stages of design and construction. These concerns, except for bridge inspection, are common to both ground-mounted and structure-mounted systems. These concerns are generally greater for bridge-mounted noise walls due to their proximity to the roadway and accessibility limitations.

A number of techniques have been successfully employed to attach noise walls to bridges. While somewhat different procedures and operations exist for attaching noise walls to existing bridges as compared to attachments to new bridges, the resultant attachment types are similar enough to be discussed under the following general categories:

### A3.1 Post and Panel Noise Barriers

#### 1. On top of parapet:

Such attachments usually include high strength bolts anchored to or embedded into the top of the parapet. On new construction, such bolts are often set in the parapet form work prior to the concrete pour. In existing parapets, bolts may be anchored by mechanical fastening or chemical bonding (epoxy grout) methods. Depending on the type of noise wall material, these high strength anchored bolts and nuts are used to secure either a continuous horizontal beam (or angle) or vertical posts to the parapet. Noise wall panels or other components are then secured to the beam or posts to create the in-place barrier. Obtaining a smooth or desired top of barrier profile with such a system may require each panel to be custom made if the top of parapet profile is not smooth and/or consistent. Any bottom of barrier jaggedness or gapping can be concealed by flashing.







2. Inserted into parapet:

This method should only be considered for new bridges. Although not as common an attachment technique, posts have been inserted into the parapet itself (either prior to casting of the parapet, or after parapet casting) via insertion into precast holes within the parapet wall itself.

3. On outside face of parapet:

Although suitable for existing and new bridges, it is particularly suitable for retrofitting of existing bridges. A rather common practice is to mount noise barriers onto the outside face of the parapet (Note: special consideration should be given in the situation of two parallel bridges, where a sizable gap between the bridges might compromise barrier performance). The barrier posts are usually attached to the parapet by one of four methods:

- *Mechanical anchoring system* - This type of anchor system consists of a wedge shaped nut which is inserted into a drilled or cast hole in the concrete parapet wall. As the bolt is turned, the nut is forced to spread and is wedged in the hole providing a solid anchor for the bolt to be sufficiently tightened. This system is limited in its use and should only be considered for use in concrete, and should not be used in situations where the anchor will be exposed to constant vibrations from traffic and wind loading. In addition, any drilling into the parapet walls may diminish its bearing capacity, particularly if reinforcing bars are severed during the drilling operation.
- *Chemical anchoring systems* - This system basically consists of a two-part epoxy mixture adhesive inserted into a drilled or cast hole in the concrete wall and then mixed by spinning the bolt inside the hole. This method is more suited for older structures and for areas where the anchors are routinely exposed to vibrations. However, the same concerns regarding the severing of the reinforcing bars during the drilling operation (see Mechanical anchoring system above) should be considered before using this method. When this product first came onto the market, concerns were expressed regarding its durability and long-term performance. These concerns appear to have been addressed by the industry, and use of this type of anchoring method is not restricted to specific applications.
- *Bolt through system* - The bolt through system uses long bolts which are inserted into holes either cast or drilled completely through the parapet walls. This method addresses most of the concerns associated with the durability of both the mechanical and the chemical anchoring

systems. However, it is more destructive to existing structures and may diminish the bearing capacity of portions of the wall.

- *Cast-in-place bolts* - Although a less commonly used method, this anchoring system is considered to be the most effective and least destructive of all methods. However, this method should only be considered for new structures or where key areas of the structure are being rehabilitated. There may also be some difficulty in maintaining bolt location tolerances due to movement of the forms during pouring.

Additional barrier anchorage may be provided via angle iron mounted to the top of the parapet. On barriers constructed as part of a new bridge construction, the bridge slab may be extended beyond the outside edge of the parapet, providing additional dead load support for the barrier

### A3.2 "Post-less" Panels

Such systems use either concealed posts or no posts with the panels, typically mounted in the following manners:

1. On top of parapet - For concealed post systems, the post to parapet connections are similar to those discussed above for the post and panel systems. For "post-less" systems, the panels (typically constructed of relatively lightweight materials) are attached via bolts to two parallel angle iron pieces mounted to the parapet.
2. On outside face of parapet - Such systems are mounted in manners similar to those for post-and-panel systems listed above except that the panels themselves are bolted to or through the parapet. With this type of system, additional detailed care should be taken in the design of the horizontal joints between panels to assure a leak-free noise condition and to maintain the consistent alignment of adjacent panels.

### A3.3 Masonry Block Noise Barriers

These barriers are "laid up" in a manner similar to ground-mounted masonry block barriers except that their anchorage is to the protective concrete bridge parapet wall, which usually has the same shape as the standard concrete traffic barrier walls, i.e., Jersey barriers. The anchoring is via reinforcing bars extending out of the top of the parapet wall. The noise barrier wall can be further strengthened by inserting reinforcing bars and concrete within the voids of the masonry blocks.

### A3.4 Cast-in-place integral with parapet wall

On occasions it may be necessary and appropriate to construct noise barriers integral with the bridge parapet wall. This type of structure-mounted noise barrier wall is more suitable where short height barriers can provide the desired noise attenuation or in situations where it may be the only possible option due to restrictions in erecting any other types of barrier systems.

### A3.5 On parallel supporting structure adjacent to parapet

This type of structure-mounted noise barrier wall is not as common as other methods mentioned previously. This mounting system is particularly suitable for older or weakened bridges, where the

structure (parapet wall, deck, and/or superstructure) is incapable of supporting the loads of the desired noise barrier system. A parallel supporting beam or similar structure may be built immediately adjacent to the existing structure. This structure would support the full vertical dead load of the noise barrier wall and all or some of the torsion load, if the beam and/or the wall were attached to the adjacent existing structure.

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## **A4 Additional Guidance on Bridge Mounted Sign Structure ADE # 812**

Most sign support structures are fabricated from structural steel tubes, angles, and plate or from aluminum tubes, angles and plate.

Fatigue failure of a support structure basically occurs because the stress ranges resulting from the wind or truck-induced gusts exceed the fatigue thresholds at critical details. Usually, these failures cannot be blamed on weld defects; rather, they are an indication that the structure is not adequately designed for the fluctuating loads and is experiencing excessively large stress ranges. This is a good reason to believe that other similar structures will soon be having similar cracking problems. Therefore, if a fatigue failure has occurred in a structure, one cannot be complacent about inspecting similar structures. All similar structures should be intensively inspected immediately.

The primary loads applied to bridge mounted sign structures are due to natural winds as well as truck gusts. Natural wind gusts exert a fluctuating force that is primarily horizontal, and the resulting motion of the mast arm is also primarily horizontal, although there is often a significant vertical motion as well. The passage of trucks beneath support structures induces both horizontal and vertical gust loads on the structure, creating a motion that is primarily vertical but may also include a significant horizontal component as well.

To protect steel structures from corroding some type of protective system is required. Though some ancillary steel structures may be painted, protection is most often provided by use of galvanizing or fabrication using weathering steel. Galvanizing is performed using the hot dip process. The protective life of a galvanized coating is determined primarily by the thickness of the coating and the severity of exposure. Environments such as exposure to industrial air pollutants or marine environments cause more rapid deterioration of the galvanized coating than, say, clean, dry rural environments.

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## A5 Additional Guidance on Fender Systems ADE # 849

The following guidance was taken from The Bridge Appurtenances, Part A – Energy Absorbing Fender Systems by Parker, Neville A. and Ansari, Farhad dates July 2003, posted online at [http://www.utrc2.org/sites/default/files/pubs/bridge-appurtenances-final\\_0.pdf](http://www.utrc2.org/sites/default/files/pubs/bridge-appurtenances-final_0.pdf).

The existing technology, which has been used for bridge fender protective systems are identified and grouped into six main categories as:

- Pile supported
- Retractable
- Rubber
- Gravity
- Hydraulic/pneumatic
- Floating systems

Energy absorbing fender systems that are commercially available are identified the following table below:

Number	Fender Type	Description	Advantage	Disadvantage
<b>A5.1</b>	<b>Standard Pile Fender Systems</b>	Employs piles driven to the bottom of the sea. Energy on a fender pile is absorbed by deflection and the limited compression of the pile. Energy absorption capacity depends on the pile and is determined on the basis of internal strain-energy characteristics.		
A5.1.1	Timber Piles	Consists of timber members. A contact frame is formed that distributes impact loads.	Low initial cost and abundant timber piles.	Limited energy absorption susceptibility to mechanical /biological damage
A5.1.2	Steel Piles	Used in water depth greater than 40 feet.	Strength and feasibility for difficult seafloor conditions.	Vulnerability to corrosion and high initial cost.
A5.1.3	Concrete Piles	Pre-stressed concrete piles with rubber buffers at deck level have been used.	Resists natural and Biological deterioration.	Limited strain energy. Capacity and corrosion of steel through cracks.
A5.1.4	Composite Piles	Composite pile is a cylindrical shell fabricated of high-strength fiber reinforced composite materials.	High-energy absorption resists natural and biological deterioration.	High initial cost.

<b>Number</b>	<b>Fender Type</b>	<b>Description</b>	<b>Advantage</b>	<b>Disadvantage</b>
<b>A5.2</b>	<b>Retractable Fender Systems</b>	A retractable fender system consists of vertical-contact posts connected by rows of wales and chocks. The fender retracts under impact, thus absorbing energy by action of gravity and friction. Energy absorption capacity depends directly on the effective weights, the angle of inclination of the supporting brackets and the maximum amount of retraction of the system.	Negligible effects of Bio-deterioration on energy absorption capacity. Low maintenance cost. Minimum equipment requirements.	Vulnerability to corrosion of the supporting brackets. High initial cost if used on open type piers.
<b>A5.3</b>	<b>Rubber Fender Systems</b>	Rubber fender consist of two major types, rubber-in- compression and rubber-in-shear.		
A5.3.1	Rubber-in-compression	Consists of a series of cylindrical rubber or rectangular tubes installed behind standard fender piles. Energy absorption is achieved by compression of the rubber. Absorption capacity depends on the size of the buffer and on maximum deflection. The energy-absorption capacity can be varied by using the tubes in single or double layers, or by varying tube size.	Simplicity and adaptability plus effectiveness at reasonable cost.	High concentrated loading may result. Initial cost is higher than standard pile system without resilient units.
A5.3.2	Rubber-in-shear	Consists of a series of rubber pads bonded between steel plates to form a series of rubber sandwiches mounted firmly as buffers between a pile-fender system and a pier. Two types of mounting units are available: standard unit or overload unit, which is capable of absorbing 100% more energy.	Capability of Cushioning impact from lateral and vertical directions. High energy absorption capacity. Favorable initial cost.	Too stiff for small vessel. Steel plates are subject to corrosion. Problems with bond between steel plates and rubber.
A5.3.3	Lord Flexible	Consists of an arch-shaped rubber block bonded between two end steel plates. It can be installed on open or bulk head-type piers, dolphins, or incorporated with standard pile or hung fender systems. Impact energy is absorbed by bending (buckling) and compression of the arch-shaped column.	High energy absorption and low terminal-load characteristics.	Bond between steel plates and rubber plus possible fatigue problems.
A5.3.4	Rubber-in-torsion	Rubber and steel combination fabricated in cone-shaped compact bumper form, molded into a specially	Capable of resisting the impact load	Bond between steel casting and



<b>Number</b>	<b>Fender Type</b>	<b>Description</b>	<b>Advantage</b>	<b>Disadvantage</b>
		cast steel frame and bonded to the steel. It absorbs energy by torsion, compression, shear and tension, but most energy is absorbed by compression.	from all directions	rubber and fatigue problems
A5.3.5	Pneumatic	Pneumatic fenders are pressurized, airtight rubber devices designed to absorb impact energy by the compression of air inside a rubber envelope. Energy absorption capacity and resistance load depend on the size and number of tires used and on the initial air pressure when inflated.	Suitable for both berthed and moored ships.	High maintenance cost.
<b>A5.4</b>	<b>Gravity Type Fender Systems</b>	Gravity fenders are normally made of concrete blocks and are suspended from heavily constructed wharf decks. Impact energy is absorbed by moving and lifting the heavy concrete blocks.	High energy absorption.	Heavy equipment requirement. Initial and maintenance costs are high.
<b>A5.5</b>	<b>Hydraulic /Pneumatic Fender Systems</b>			
A5.5.1	Dashpot hydraulic	Consists of a cylinder full of oil or other fluid so arranged that when a plunger is depressed by impact, the fluid is displaced through a non-variable or variable orifice into a reservoir at higher elevation. Suitable where severe wind, wave, swell, and current conditions exist.	Favorable energy absorption characteristics.	High initial and maintenance costs.
A5.5.2	Hydro-pneumatic floating fender	This is a system of floating rubber envelopes filled with water and air, which absorbs energy by viscous resistance or by air compression.	Favorable energy absorption characteristics	High initial and maintenance costs.
<b>A5.6</b>	<b>Floating Fender Systems</b>	Consist of floating logs, which ride up and down against the timber breasting face.	Easy application. High water depths.	Low energy absorption

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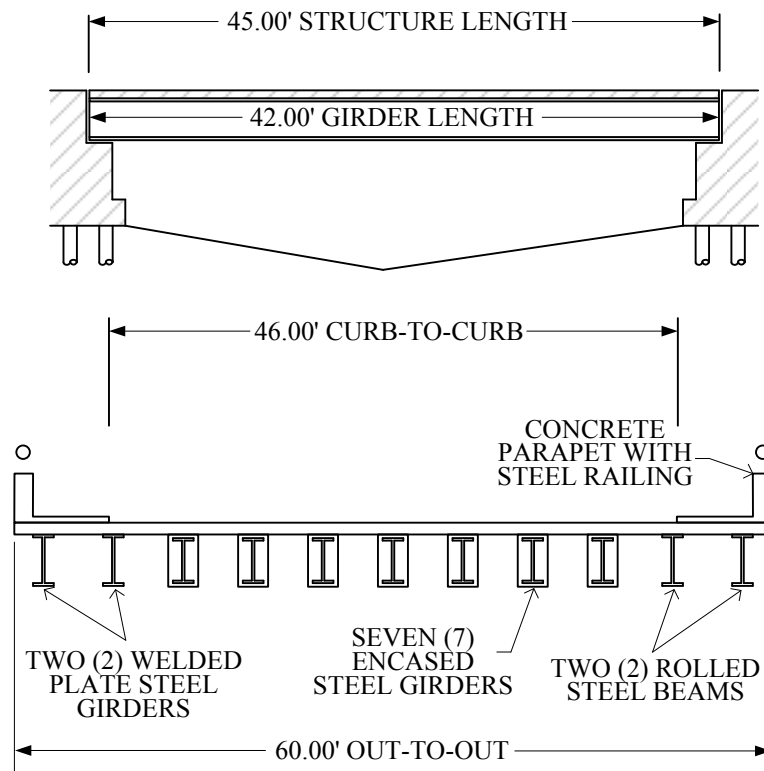
## Appendix B —NJDOT Inspection Examples

Examples B1 thru B3 show the evaluation and coding of bridge element level inspection data for Steel Multi-Girder Bridge, Prestressed Concrete Adjacent Box Beam Bridge, and Reinforced Concrete Box Culvert. These examples were developed by NJDOT to demonstrate the use of the defect codes, National Bridge Elements (NBEs), Bridge Management Elements (BMEs), and Agency Defined Elements (ADEs); and maintain consistency in recording them.

The sections B4 thru B6 include examples of Timber Bridge, Prestressed Concrete Girder Bridge, and Steel Truss Bridge taken from AASHTO Manual for Bridge Element Inspection, First Edition, 2013. The examples include the use of National Bridge Elements (NBEs), Bridge Management Elements (BMEs) and the recording of defects.

## B1 Single Span Steel Multi-Girder Bridge

The subject of this example is a single-span multi-girder bridge crossing a lake. The bridge was originally constructed using 7 concrete encased steel girders and later widened with 2 additional rolled steel beams and 2 additional welded plate steel girders. The sketches in Figure B1.1 show the bridge elements with relevant dimensions.



**Figure B1.1—Elevation and Deck Cross Section**

### B1.1 Element Quantities

#### B1.1.1 — Deck/Approaches

The reinforced concrete deck has epoxy coated reinforcing steel and no protective overlay. There is a compression joint seal at both abutments extending out-to-out of the bridge deck. There is no skew. There are reinforced concrete approach slabs at each end of the bridge that are consistent with the bridge curb-to-curb width and extend 20' from the bridge. The approach slabs do not have epoxy coated reinforcing steel.

Reinforced Concrete Deck (Element 12)

*Quantity: 45 ft x 60 ft = 2,700 ft<sup>2</sup>*

Concrete Reinforcing Steel Protective System (Element 520)

*Quantity: 45 ft x 60 ft = 2,700 ft<sup>2</sup>*

Compression Joint Seal (Element 302)

*Quantity: 60 ft. x 2 seals = 120 ft.*

Reinforced Concrete Approach Slab (Element 321)

*Quantity: 46 ft. x 20 ft. x 2 Approaches = 1,840 ft<sup>2</sup>*

Reinforced concrete parapets with steel ornamental railings run on both sides of the bridge with curbs and sidewalks. **Since the railing material is steel, even though** ~~However,~~ as the steel railing does not serve as a redirective element, the metal bridge railing ~~concrete bridge railing~~ element is coded. **For overall element assessment, any defect in the concrete railing portion (if any) needs to be included in Metal Bridge Railing.**

**Metal Bridge Railing (Element 330) Reinforced Concrete Bridge Railing (Element 331)**

*Quantity: 45 ft. x 2 bridge railings = 90 ft.*

Curbs/Sidewalks – Reinforced Concrete (Element 802)

*Quantity: 45 ft. x 2 Curbs/Sidewalks = 90 ft.*

### B1.1.2 – Superstructure

All girders/beams extend approximately 1 ft past the bearings at each end as indicated on the bridge plans. The steel open girders/beams are protected with paint.

Steel Open Girder/Beam (Element 107)

*Quantity: 42 ft x 11 girders = 462 ft.*

Concrete Encasement (Element 891)

*Quantity: 42 ft. x 7 girders = 294 ft.*

Steel Protective Coating (Element 515)

*Quantity: 2.25 ft. (Beam Depth) x 2 x 42 ft (Beam Length) + .83 ft (Flange Width) x 3 (exposed flange faces) x 42 = 294 ft<sup>2</sup> per beam (Rolled Steel Beams only)*

*3.79 ft. (Girder Depth) x 2 x 42 ft. (Girder Length) + 1 ft. (Flange Width) x 3 x 42*

*= 444 ft<sup>2</sup> per girder (Welded Plate Girders only)*

*= 294 x 2 + 444 x 2 = 1,476 ft<sup>2</sup> (Total Paint)*

Fixed bearings are at one abutment while elastomeric bearings are on the painted steel girders/beams and sliding plate bearings are on the concrete encased girders at the other abutment.

Fixed Bearing (Element 313)

*Quantity: 1 bearing per girder x 11 total girders = 11 Fixed Bearings*

Sliding Plate Bearing (Element 832)

*Quantity: 1 bearing per concrete encased girder x 7 concrete encased girders*

*= 7 Sliding Plate Bearings*

Elastomeric Bearing (Element 310)

*Quantity: 1 bearing per steel open girder/beam x 4 steel open girder/beams*

*= 4 Elastomeric Bearings*

### B1.1.3 — Substructure

The reinforced concrete abutments have integral wingwalls and distributes vertical load to the piles (not visible for inspection) and retains the approach roadway embankment. The wingwalls are approximately half covered with fill. Bridge plans also indicated epoxy coated reinforcement throughout the entire substructure.

Reinforced Concrete Abutment (Element 215)

*Quantity: 60 ft. (Abutment Length) x 2 + 32 ft. (Wingwall Length) x 4 = 248 ft.*

Concrete Reinforcing Steel Protective System (Element 520)

*Quantity: 60 ft. x 25 ft. (Height that is visible for inspection inc. underwater) x 2 abutments + 32 ft. x 25 ft. x .5 (Half of wingwall visible for inspection due to fill) x 4 wingwalls = 4,600 ft<sup>2</sup>*

## B1.2 Element Condition States

### B1.2.1 — Defect #1, Reinforced Concrete Deck (Element 12)

Transverse, hairline cracks throughout at variable spacing greater than 3 ft throughout the top surface of the deck. Based on the cracks' widths (less than 0.012 in) and density (greater than 3 ft), the entire deck meets the criteria for Condition State 1.

### B1.2.2 — Defect #2, R.C. Approach Slab (Element 321)

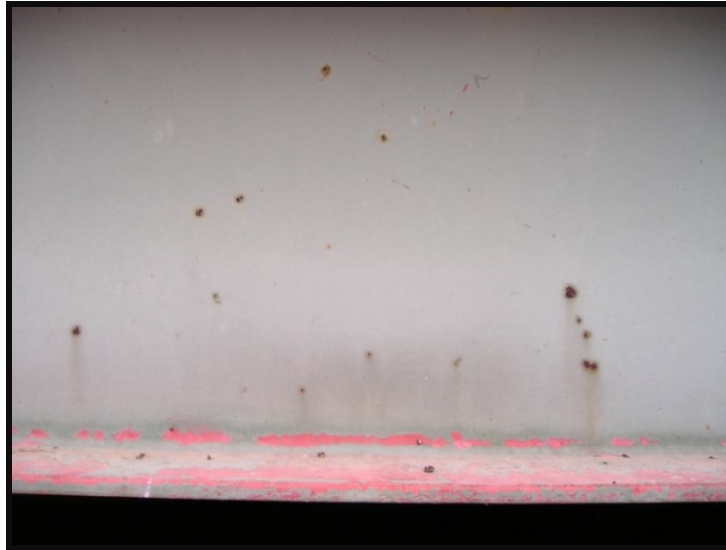
A wide crack was noted in the approach slab measuring approximately 0.25 in wide and 15 ft long. Based on the crack width measurement of greater than 0.05 in, this area met the criteria for Condition State 3. The affected area (Defect #1130) is coded in ft<sup>2</sup> (1 ft x 15 ft = 15 ft<sup>2</sup>). Since this is the only defect noted in the approach slabs, the remainder of the area meets the criteria for Condition State 1.



**Figure B1.2 –Wide Transverse Crack on Approach Slab**

### **B1.2.3 — Defect #3, Steel Open Girder/Beam (107) & Steel Protective Coating (515)**

The paint on both fascia girders/beams exhibits chalking with loss of pigment throughout the entire exterior web face. The exterior top side of the bottom flange exhibits peeling of the entire finish coat with the primer coat left intact. Localized at 1 area on the fascia girder web, there is some bubbling with exposed rusted bare metal (3 ft height x 5 ft length). No section loss was present. 15 ft<sup>2</sup> is coded in Condition State 2 for Corrosion (Defect # 1000), as no section loss is evident. 15 ft<sup>2</sup> is coded Condition State 3 for Peeling/Bubbling/Cracking (Defect # 3420) and the remainder of the Steel Protective Coating is coded in Condition State 2 for Chalking (Defect # 3410).



**Figure B.1.3—Fascia Beam Paint Condition**

### **B1.2.4 — Defect #4, Elastomeric Bearing (Element 310)**

The South fascia elastomeric bearing exhibits minor undermining with a loss of less than 10% of the total bearing area. Additionally, bulging was noted (less than 15% of the thickness). Since two defects exist at the same bearing, the only defect coded is Loss of Bearing Area (Defect # 2240) as it is the more severe of the two defects. The remaining elastomeric bearings exhibit no defects and are coded in Condition State 1.



**Figure B.1.4—South Fascia Elastomeric Bearing**



### B1.2.5 — Defect #5, Concrete Encasement (Element 891)

One girder exhibits a small spall approximately 1 in deep that has exposed the girder bottom flange. 1 ft is coded for Delamination/ Spall/ Patched Area (Defect #1080) in Condition State 2. There is an area of 15 ft exhibiting heavy rust staining, which is coded for Efflorescence/ Rust Staining (Defect #1120) in Condition State 3. All concrete encased girders exhibit moderate scaling that has exposed the coarse aggregate; however it remains secure in the concrete. The remaining area is coded for Abrasion/ Wear (Defect #1190) in Condition State 2. Due to the spall and rust staining defects, the condition of the Steel Open Girder/Beam element is coded in the same condition states because those encasement defects are indicative of problems with the steel.



**Figure B1.5—Typical Concrete Encasement Condition (Left), Localized Spalling of Concrete Encasement (Right)**

### B1.2.6 — Defect #6, Reinforced Concrete Abutment (Element 215)

Both abutments exhibit heavy efflorescence build-up with some rust staining underneath all bearings. This defect is coded 22 ft (22 bearings x 1 ft) for Efflorescence/ Rust Staining (Defect #1120) in Condition State 3. Additionally, the underwater inspection report noted an area of minor scour approximately 12 ft on the Northwest wingwall. This defect is coded 12 ft for Scour (Defect #6000) in Condition State 2.



**Figure B1.6—Typical Efflorescence Staining**



### B1.3 Element Quantity and Condition State Summary

Element Number	Element Description	Unit of Measure	Total Quantity	CS1	CS2	CS3	CS 4	Defect #
12	Reinforced Concrete Deck	ft <sup>2</sup>	2,700	2,700	0	0	0	1
520	Concrete Reinforcing Steel Protective System	ft <sup>2</sup>	2,700	2,700	0	0	0	N/A
302	Compression Joint Seal	ft	120	120	0	0	0	N/A
331	<del>Reinforced Concrete Bridge Railing</del>	<del>ft</del>	<del>90</del>	<del>90</del>	<del>0</del>	<del>0</del>	<del>0</del>	<del>N/A</del>
330	Metal Bridge Railing	ft	90	90	0	0	0	N/A
802	Curbs/Sidewalk – Reinforced Concrete	ft	90	90	0	0	0	N/A
321	Reinforced Concrete Approach Slab	ft <sup>2</sup>	1,840	1,825	0	15	0	2
1130	<i>Cracking (RC and Other)</i>	<i>ft<sup>2</sup></i>	<i>15</i>	<i>0</i>	<i>0</i>	<i>15</i>	<i>0</i>	<i>2</i>
107	Steel Open Girder/Beam	ft	462	424	16	22	0	3
1000	<i>Corrosion</i>	<i>ft</i>	<i>15</i>	<i>0</i>	<i>15</i>	<i>0</i>	<i>0</i>	<i>3</i>
515	Steel Protective Coating	ft <sup>2</sup>	1,476	0	15	1,461	0	3
3410	<i>Chalking</i>	<i>ft<sup>2</sup></i>	<i>1461</i>	<i>0</i>	<i>1,461</i>	<i>0</i>	<i>0</i>	<i>3</i>
3420	<i>Peeling/Bubbling/ Cracking</i>	<i>ft<sup>2</sup></i>	<i>15</i>	<i>0</i>	<i>0</i>	<i>15</i>	<i>0</i>	<i>3</i>
891	Concrete Encasement	ft	294	0	294	0	0	5
1080	<i>Delamination/Spall/ Patched Area</i>	<i>ft</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>5</i>
1120	<i>Efflorescence/ Rust Staining</i>	<i>ft</i>	<i>22</i>	<i>0</i>	<i>0</i>	<i>22</i>	<i>0</i>	<i>6</i>
1190	<i>Abrasion/ Wear (PSC/RC)</i>	<i>ft</i>	<i>293</i>	<i>0</i>	<i>293</i>	<i>0</i>	<i>0</i>	<i>5</i>
310	Elastomeric Bearing	each	4	3	1	0	0	4
2240	<i>Loss of Bearing Area</i>	<i>each</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>4</i>
313	Fixed Bearing	each	11	11	0	0	0	N/A
832	Sliding Plate Bearing	each	7	7	0	0	0	N/A
215	Reinforced Concrete Abutment	ft	248	214	12	22	0	6
1120	<i>Efflorescence/ Rust Staining</i>	<i>ft</i>	<i>22</i>	<i>0</i>	<i>0</i>	<i>22</i>	<i>0</i>	<i>6</i>
6000	<i>Scour</i>	<i>ft</i>	<i>12</i>	<i>0</i>	<i>12</i>	<i>0</i>	<i>0</i>	<i>6</i>

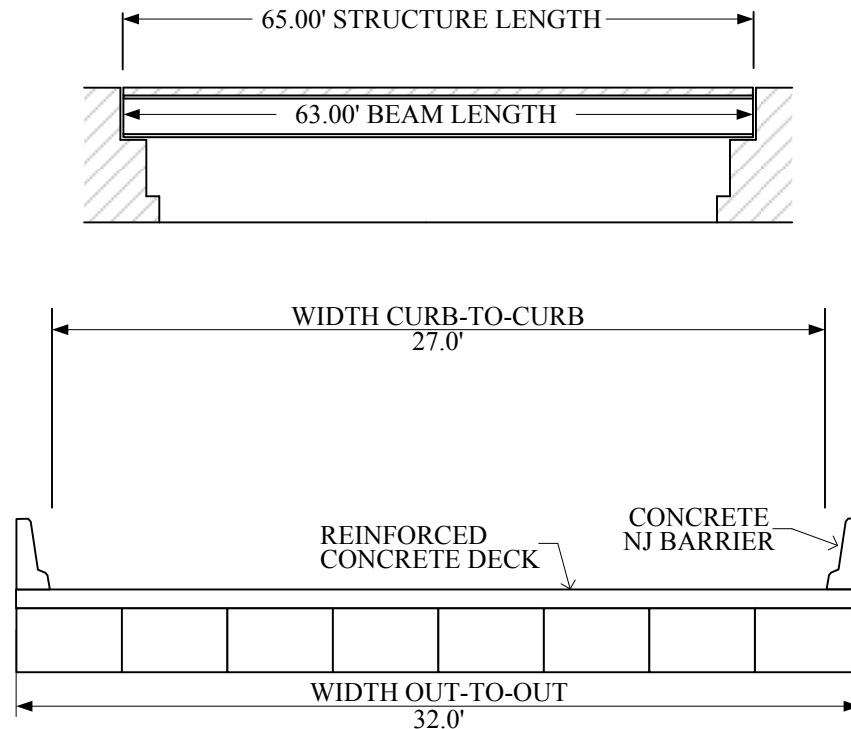
**Notes:**

Violet Background: National Bridge Element  
 Blue Background: Bridge Management Element  
 Grey Background: NJDOT Agency Developed Element  
*Italic Type:* Defect

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## B2 Single Span Adjacent Prestressed Concrete Box Beam Bridge

The subject of this example is a single-span adjacent prestressed concrete box beam bridge crossing a local roadway. The bridge was constructed with 8 beams in 2010 and is overall in very good condition with no significant defects noted in the most recent inspection report. The sketches in Figure B2.1 show the bridge elements with relevant dimensions.



**Figure B2.1—Elevation and Deck Cross Section**

### B2.1 Element Quantities

#### B2.1.1 — Deck/Approaches

The reinforced concrete deck has epoxy coated reinforcing steel and no protective overlay. There is an elastomeric-type joint seal at each abutment extending out-to-out of the bridge deck. There is no skew. There are reinforced concrete approach slabs at each end of the bridge that are consistent with the bridge curb-to-curb width and extend 5' from the bridge. The approach slabs do not have epoxy coated reinforcing steel. Reinforced Concrete New Jersey-type barriers are at both sides of the bridge and there are no sidewalks.

Reinforced Concrete Deck (Element 12)

*Quantity: 65 ft x 32 ft = 2,080 ft<sup>2</sup>*

Concrete Reinforcing Steel Protective System (Element 520)

*Quantity: 65 ft x 32 ft = 2,080 ft<sup>2</sup>*

Elastomeric Flex-Type Joint (Element 861)

*Quantity: 32 ft x 2 seals = 64 ft*

Reinforced Concrete Approach Slab (Element 321)  
*Quantity: 27 ft x 5 ft x 2 Approaches = 270 ft<sup>2</sup>*

Reinforced Concrete Bridge Railing (Element 331)  
*Quantity: 65 ft x 2 bridge railings = 130 ft*

### **B2.1.2 — Superstructure**

All box beams extend approximately 1 ft past the bearings (elastomeric) at each end as indicated on the bridge plans. Mild reinforcement steel is coated with epoxy.

Prestressed Concrete Closed Web/Box Girder (Element 104)  
*Quantity: 63 ft x 8 beams = 504 ft*

Elastomeric Bearing (Element 310)  
*Quantity: 8 beams x 2 bearings per beam = 16 Elastomeric Bearings*

Concrete Reinforcing Steel Protective System (Element 520)  
*Quantity: 63 ft (Beam Length) x 4 ft (Beam Width) x 8 beams + 63 ft x 2.25 ft (Beam Height) x 2 (Visible Fascia Beam Faces) = 2,300 ft<sup>2</sup> – Only visible surfaces are coded*

### **B2.1.3 — Substructure**

The reinforced concrete abutments have non-integral wingwalls separated from the abutments by construction joints and distribute vertical load to spread footings (not visible for inspection). Bridge plans do not indicate epoxy coated reinforcement.

Reinforced Concrete Abutment (Element 215)  
*Quantity: 40 ft (Abutment Length) x 2 = 80 ft*

Wingwalls - Reinforced Concrete (Element 842)  
*Quantity: 20 ft (Wingwall Length) x 4 = 80 ft*

## **B2.2 Element Condition States**

### **B2.2.1 — Defect #1, Reinforced Concrete Deck (Element 12)**

Transverse, hairline cracks throughout at variable spacing greater than 3 ft throughout the top surface of the deck. Based on the cracks' widths (less than 0.012 in) and density (greater than 3 ft), the entire deck meets the criteria for Condition State 1.

### **B2.2.2 — Defect #2, Wingwalls - Reinforced Concrete (Element 842)**

Vertical cracks measuring approximately 0.04 inches wide with variable spacing between 1.0 ft and 3.0 ft in the East wingwall for 15 feet length. Based on the cracks' width (less than 0.05 in) and density (between 1ft and 3 ft). 15 ft is coded for Cracking (Defect #1120) in Condition State 2. The remaining 65ft is coded in Condition State 1.

## B2.3 Element Quantity and Condition State Summary

Element Number	Element Description	Unit of Measure	Total Quantity	CS1	CS2	CS3	CS4	Defect #
12	Reinforced Concrete Deck	ft <sup>2</sup>	2,080	2,080	0	0	0	1
520	Concrete Reinforcing Steel Protective System	ft <sup>2</sup>	2,080	2,080	0	0	0	N/A
861	Elastomeric Flex-type Joint	ft	64	64	0	0	0	N/A
331	Reinforced Concrete Bridge Railing	ft	130	130	0	0	0	N/A
321	Reinforced Concrete Approach Slab	ft <sup>2</sup>	270	270	0	0	0	N/A
104	Prestressed Concrete Closed Web/Box Girder	ft	504	0	0	0	0	N/A
520	Concrete Reinforcing Steel Protective System	ft <sup>2</sup>	2,300	2,300	0	0	0	N/A
310	Elastomeric Bearing	each	16	16	0	0	0	N/A
215	Reinforced Concrete Abutment	ft	80	80	0	0	0	N/A
842	Wingwalls – Reinforced Concrete	ft	80	65	15	0	0	2
1130	<i>Cracking (RC and Other)</i>	<i>ft</i>	<i>15</i>	<i>0</i>	<i>15</i>	<i>0</i>	<i>0</i>	<i>2</i>

### Notes:

Violet Background: National Bridge Element  
 Blue Background: Bridge Management Element  
 Grey Background: NJDOT Agency Developed Element  
*Italic Type*: Defect

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### B3 Single Barrel Reinforced Concrete Box Culvert with fill

The subject of this example is a single barrel, reinforced concrete box culvert with fill. The sketch in Figure B3.1 shows the culvert elements with relevant dimensions.

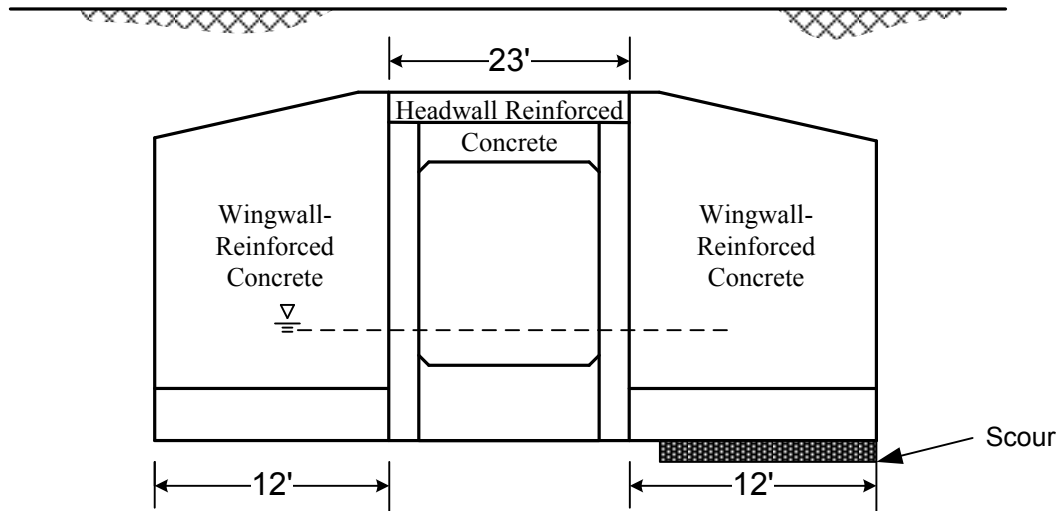


Figure B3.1—Elevation and Deck Cross Section

#### B3.1 Element Quantities

##### B3.1.1 — Culvert

The culvert is reinforced concrete box with fill. Plans indicate epoxy coated rebar only in the top layer of the roof slab, which is not visible for inspection. Therefore, we have not coded Item 520 for Concrete Reinforcing Steel Protective System.

Concrete Culvert (Element 241)

Quantity:  $50 \text{ ft (length of barrel)} \times 1(\text{barrel}) = 50 \text{ ft}$

Wingwalls – Reinforced Concrete (Element 842)

Quantity:  $12 \text{ ft} \times (4 \text{ Wingwalls}) = 48 \text{ ft}$

Headwalls – Reinforced Concrete (Element 846)

Quantity:  $23 \text{ ft} \times (2 \text{ Headwalls}) = 46 \text{ ft}$

#### B3.2 Element Condition States

##### B3.2.1 — Defect #1, Concrete Culvert (Element 241)

1-in to 2-in deep spalls with exposed rebar (with no section loss). The total length of exposed rebar (Defect # 1090) is 1 ft, and it meets Condition State 2. The first spall is 4 feet long and less than 1-in deep (Defect # 1080) shown in Figure B3.2 (Left) meet the criteria for Condition State 2. The second spall is 3 feet long (with exposed rusted rebar), more than 1-in depth as shown in Figure B3.2 (Right), and meet the criteria of Condition state 3.



**Figure B3.2—Spalls with exposed Rebar at Roof Slab.**

**B3.2.2 —Defect #2, Reinforced Concrete Wingwall (Element 842)**

Scour with exposed footing (11 feet long) along the south end of wingwall. Max vertical reveal of 6” and 12” probe through silt (Defect # 6000) meet the criteria for Condition State 2.

**B3.3 Element Quantity and Condition State Summary**

<b>Element Number</b>	<b>Element Description</b>	<b>Unit of Measure</b>	<b>Total Quantity</b>	<b>CS1</b>	<b>CS2</b>	<b>CS3</b>	<b>CS4</b>	<b>Defect #</b>
<b>241</b>	<b>Reinforced Concrete Culvert</b>	<b>ft</b>	<b>50</b>	<b>43</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>
<i>1080</i>	<i>Delamination/Spall/ Patched Area</i>	<i>ft</i>	<i>7</i>	<i>0</i>	<i>4</i>	<i>3</i>	<i>0</i>	<i>1</i>
<i>1090</i>	<i>Exposed Rebar</i>	<i>ft</i>	<i>1</i>	<i>0</i>	<i>*1</i>	<i>0</i>	<i>0</i>	<i>1</i>
<b>842</b>	<b>Wingwalls – Reinforced Concrete</b>	<b>ft</b>	<b>48</b>	<b>37</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>2</b>
<i>6000</i>	<i>Scour</i>	<i>ft</i>	<i>11</i>	<i>0</i>	<i>11</i>	<i>0</i>	<i>0</i>	<i>2</i>
<b>846</b>	<b>Headwalls – Reinforced Concrete</b>	<b>ft</b>	<b>46</b>	<b>46</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>N/A</b>

**Notes:**

Violet Background: National Bridge Element  
 Blue Background: Bridge Management Element  
 Grey Background: NJDOT Agency Developed Element  
*Italic Type:* Defect

\* Exposed Rebar (Defect # 1090) for Condition State 2 (Quantity = 1 ft) is not aggregated into Element 241 because Delamination/ Spall/ Patched Area (Defect # 1080) is also located in the same area.



## B4 Timber Bridge (AASHTO Example)

The subject of this example is a four-span timber bridge crossing a small creek. The sketches in Figure B4.1 show the bridge elements with relevant dimensions and note the locations of the defects described in the “Element Condition States” section below:

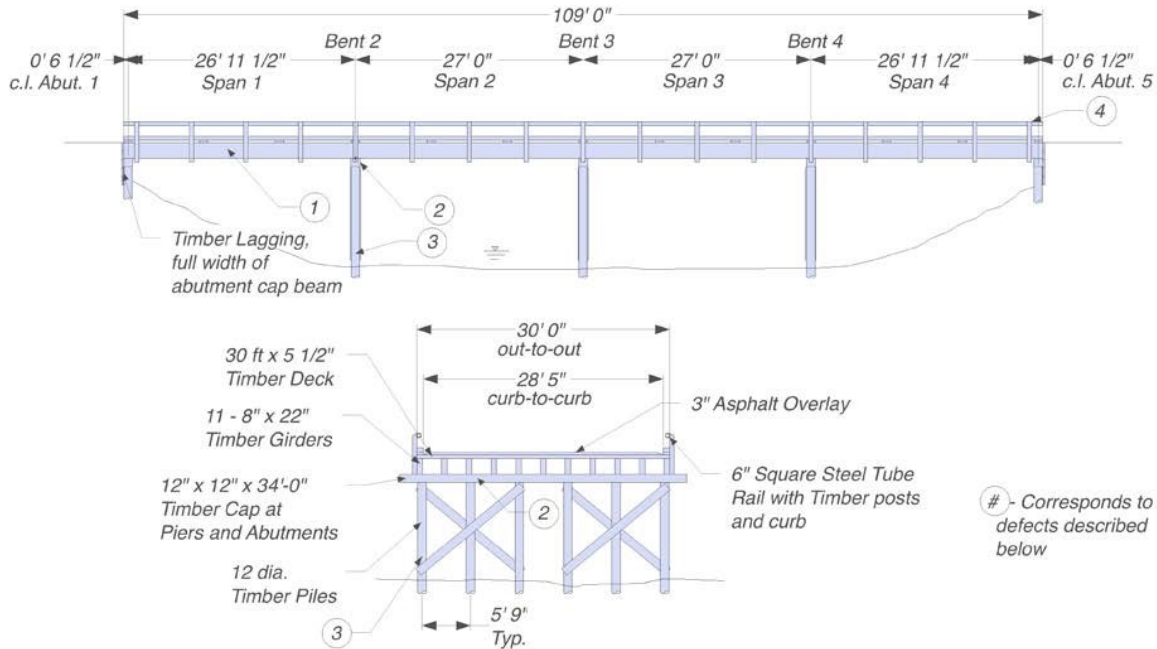


Figure B4.1 – Elevation and typical section

### B4.1 Element Quantities

#### B4.1.1 - Deck

The timber deck has an asphalt wearing surface that runs curb to curb:

Timber Deck (Element #31) Quantity: 30 ft. x 109 ft. = 3,270 sq. ft.

Wearing Surface (Element #510) Quantity: 28.42 ft. x 109 ft. = 3,097.78 sq. ft. (round up to 3,098 sq. ft.)

The metal bridge railing has timber posts and curb. The square steel tube rail elements are galvanized:

Metal Bridge Railing (Element #330) Quantity: 109 ft. x (2 railing lines) = 218 ft.

Steel Protective Coating (Element #515) Quantity: 0.50 ft. x (4 sides) x 109 ft. x (2 railing lines) = 436 sq. ft.

### B4.1.2 - Superstructure

All four spans are composed of timber beams:

Timber Open Girder/Beam (Element #111) Quantity: 109 ft. x (11 beams) = 1,199 ft.

### B4.1.3 - Substructure

As separate elements distribute vertical loads to the piles and retain the approach embankment, the vertical load-carrying elements will be considered similar to a bent and the timber abutment will consist of only the lagging retaining the approach embankment behind the abutment piles and cap beam:

Timber Abutment (Element #216) Quantity: 34 ft. x (2 abutments) = 68 ft.

The timber piles at the abutments and bents can be visually inspected to mud line:

Timber Pile (Element #228) Quantity: (6 piles per substructure unit) x (3 bents + 2 abutments) = 30 piles

Vertical load is transferred to the piles at the abutments and bents by the timber bent caps:

Timber Pier Cap (Element #235) Quantity: (34 ft. per substructure unit) x (3 bents + 2 abutments) = 170 ft.

## B4.2 Element Condition States

Aside from the defects described below, all remaining element quantities are in good condition and are assigned to Condition State One. The following defects correspond to those labeled in Figure B-1:

### B4.2.1 - Defect #1, Timber beam (Element #111)

A 2 in. deep check (Defect #1150) extends the length of the right side exterior beam in Span 1, shown in Figure B4.2. As it penetrates 25% (2 in. of the 8 in. member thickness), the length of this beam (27 ft.) is placed in Condition State 2. No other defects are present in the element.

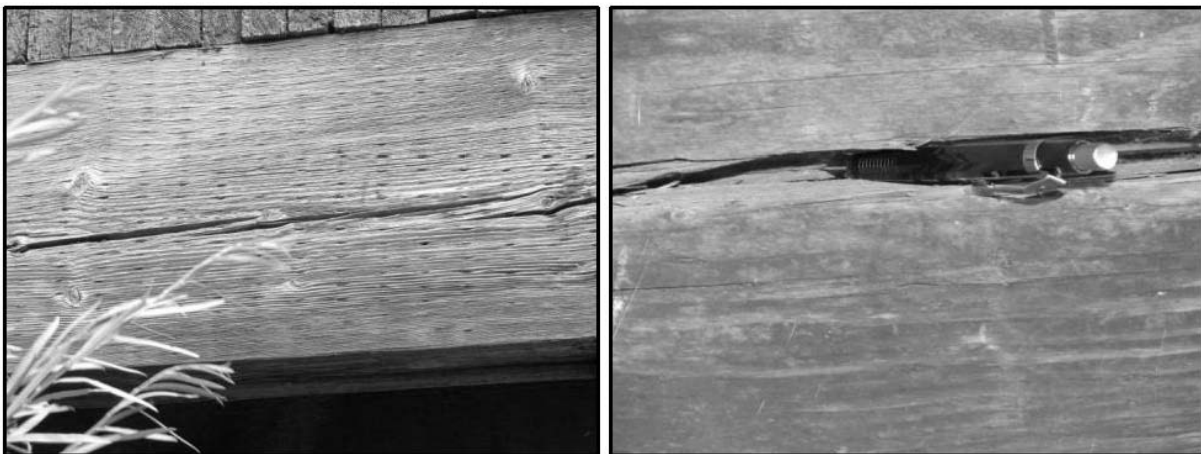


Figure B4.2 – 2 inch deep check in exterior beam

#### B4.2.2 - Defect #2, Timber bent cap (Element #235)

A 1 in. deep check (Defect #1150) extends the length of the bent cap at Bent 2 as shown in Figure B4.3. As it penetrates 8% (1 in. of the 12 in. width of the member), the length of this beam (34 ft.) is placed in Condition State 2. No other defects are present in the element.



Figure B4.3 – 1 inch deep check in bent cap at Bent 2

#### B4.2.3 - Defect #3, Timber pile (Element #228)

A 7 in. deep check (Defect #1150) 3 ft. long is present in the left exterior pile of Bent 2 as seen in Figure B4.4. As it penetrates 58% (7 in. of the 12 in. member thickness), this condition meets the criteria for either Condition State 3 or Condition State 4. Per Agency guidance, the severity of the check does not warrant structural review, and this pile is placed in Condition State Three. Five other piles exhibit 1½ in. to 2 in. deep checks (not shown) and are placed in Condition State 2.



Figure B4.4 – 7 inch deep check in right exterior pile of Bent 2

#### **B4.2.4 - Defect #4, Metal Bridge railing (Element #330)**

Two posts at Abutment 4 exhibit severe decay (Defect #1140) affecting 80% of the post section. Based on the severity and extent of the decay, this defect warrants structural review and the horizontal length of rail represented by the posts (2 ft.) is placed in Condition State 4.



**Figure B4.5: Decay in timber rail posts**

### B4.3 Element Quantity and Condition State Summary

The element quantities and defects described above are summarized as follows:

Element Number	Element Description	Unit of Measure	Total Quantity	CS1	CS2	CS3	CS4	Defect #
<b>31</b>	<b>Timber Deck</b>	sq. ft.	<b>3,270</b>	<b>3,270</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>510</b>	<b>Wearing Surfaces</b>	sq. ft.	<b>3,098</b>	<b>3,098</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>330</b>	<b>Metal Bridge Railing</b>	ft.	<b>218</b>	<b>216</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<i>1140</i>	<i>Decay/ Section Loss</i>	<i>ft.</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>4</i>
<b>515</b>	<b>Steel Protective Coating</b>	sq. ft.	<b>436</b>	<b>436</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>111</b>	<b>Timber Open Girder/Beam</b>	ft.	<b>1,199</b>	<b>1,172</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>1</b>
<i>1150</i>	<i>Check/ Shake</i>	<i>ft.</i>	<i>27</i>	<i>0</i>	<i>27</i>	<i>0</i>	<i>0</i>	<i>1</i>
<b>228</b>	<b>Timber Pile</b>	Each	<b>30</b>	<b>24</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>3</b>
<i>1150</i>	<i>Check/ Shake</i>	<i>Each</i>	<i>6</i>	<i>0</i>	<i>5</i>	<i>1</i>	<i>0</i>	<i>3</i>
<b>216</b>	<b>Timber Abutment</b>	ft.	<b>68</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>235</b>	<b>Timber Pier Cap</b>	ft.	<b>170</b>	<b>136</b>	<b>34</b>	<b>0</b>	<b>0</b>	<b>2</b>
<i>1150</i>	<i>Check/ Shake</i>	<i>ft.</i>	<i>34</i>	<i>0</i>	<i>34</i>	<i>0</i>	<i>0</i>	<i>2</i>

#### Notes:

Violet background: National Bridge Element  
 Blue background: Bridge Management Element  
*Bold italic type: Defect*

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## B5 Prestressed Concrete Girder Bridge

The subject of this example is a four-span prestressed concrete girder bridge crossing a divided highway. The sketches in Figure B5.1 show the bridge elements with relevant dimensions and note the locations of the defects described in the “Element Condition States” section below:

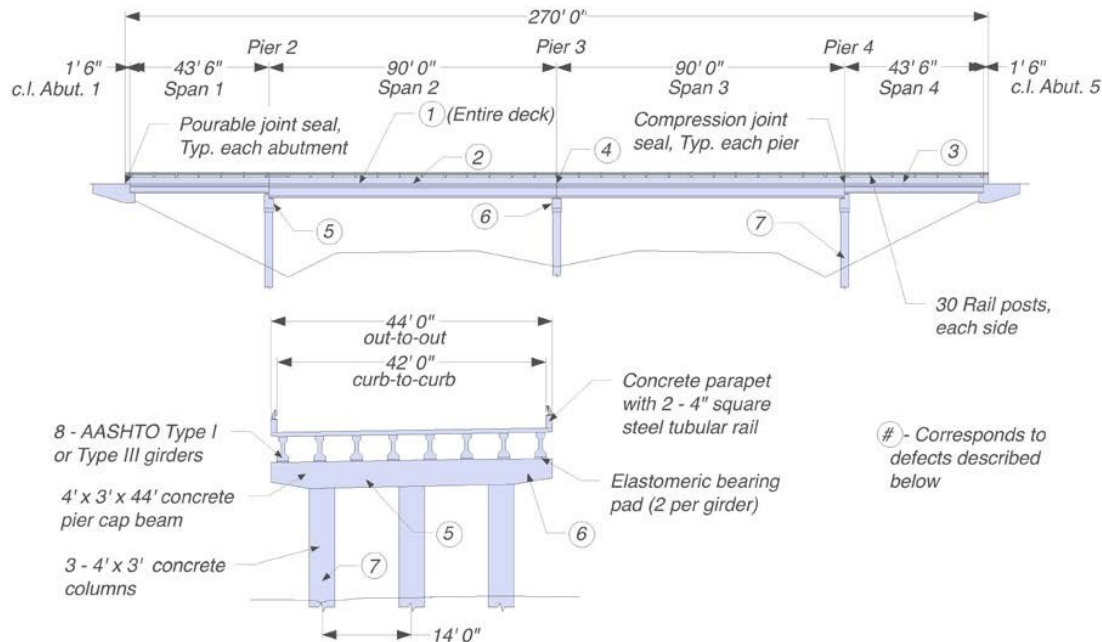


Figure B5.1: Elevation and typical section

### B5.1 Element Quantities

#### B5.1.1 - Deck

The reinforced concrete deck has uncoated reinforcing steel and no protective overlay.

Reinforced Concrete Deck (Element #12) Quantity: 270 ft. x 44 ft. = 11,880 sq. ft.

As the redirective elements of the bridge railing consists of a combination of concrete and metal components, both the metal and reinforced concrete railing elements will be considered. The metal railing members are galvanized – estimate the surface area of each metal post as 5 sq. ft.:

Metal Bridge Railing (Element #330) Quantity: 270 ft. x (2 railing lines) = 540 ft.

Steel Protective Coating (Element #515) Quantity:  $[0.33 \text{ ft.} \times (4 \text{ sides})] \times (2 \text{ rails}) \times 270 \text{ ft.} + 5 \text{ sq. ft. per post} \times 30 \text{ posts}] \times (2 \text{ railing lines}) = 1,725.60 \text{ sq. ft. (rounded up to 1726 sq. ft.)}$

**Reinforced Concrete Bridge Railing (Element #331) Quantity: ~~270 ft. x (2 railing lines) = 540 ft.~~ (Note: The defects for Reinforced Concrete portion (if any) will be included in Metal Bridge Railing.)**

There is a deck joint at every substructure unit, extending out-to-out of the bridge deck, with pourable joint seals at the abutments and compression joint seals at the piers. There is no skew:



Pourable Joint Seal (Element #301) Quantity: 44 ft. x (2 joints) = 88 ft.  
Compression Joint Seal (Element #302) Quantity: 44 ft. x (3 joints) = 132 ft.

### **B5.1.2 - Superstructure**

Since the prestressed concrete girders extend past the bearings and are embedded in the end and pier diaphragms, the length of the bridge minus the backwall thickness (1 ft. at each end) provides a good estimate of the total length of each girder line:

Prestressed Concrete Open Girder (Element #109) Quantity: [270 ft. – (2 x 1ft.)] x (8 Girders) = 2,144 ft.

Elastomeric bearings transfer load from the girders to the substructure:

Elastomeric Bearing (Element #310) Quantity: (2 bearings per girder) x (8 girders per span) x (4 spans) = 64 bearings

### **B5.1.3 - Substructure**

The reinforced concrete abutment distributes vertical load to the piles (not visible for inspection) and retains the approach embankment.

Reinforced Concrete Abutment (Element #215) Quantity: (44 ft. per abutment) x (2 abutments) = 88 ft.

Each reinforced concrete pier consists of a pier cap (Element #234) and three columns (Element #205):

Reinforced Concrete Column (Element #205) Quantity: (3 columns per pier) x (3 piers) = 9 columns

Reinforced Concrete Pier Cap (Element #234) Quantity: (44 ft. per pier) x (3 piers) = 132 ft.

## **B5.2 Element Condition States**

Aside from the defects described below, all remaining element quantities are in good condition and assigned to Condition State One. The following defects correspond to those labeled in Figure B5.1:

### **B5.2.1 Defect #1, Reinforced Concrete Deck (Element #12)**

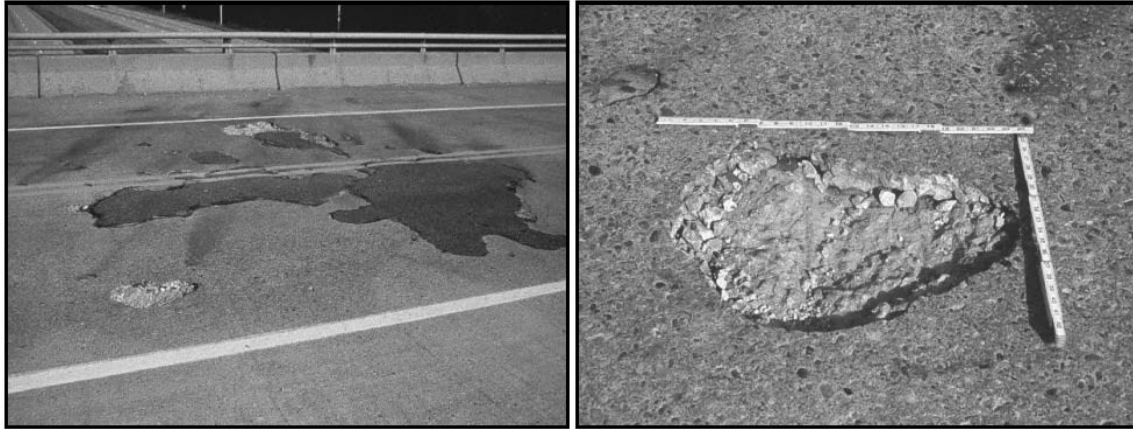
Transverse, hairline cracks throughout at variable spacing greater than 3 ft. throughout the top surface of the deck. Based on the cracks' widths (less than 0.012 in.) and density (greater than 3 ft.), these areas meet the criteria for Condition State 1.

### **B5.2.2 Defect #2, Reinforced Concrete Deck (Element #12)**

1 in. to 2 in. deep spalls with exposed rebar (with no section loss) and areas of distressed patches in both lanes near midspan of Span 2, shown in Figure B5.2. The total area of spalls is 12 sq. ft.; the total area of distressed patches is 100 sq. ft. With no section loss, the exposed rebar (Defect



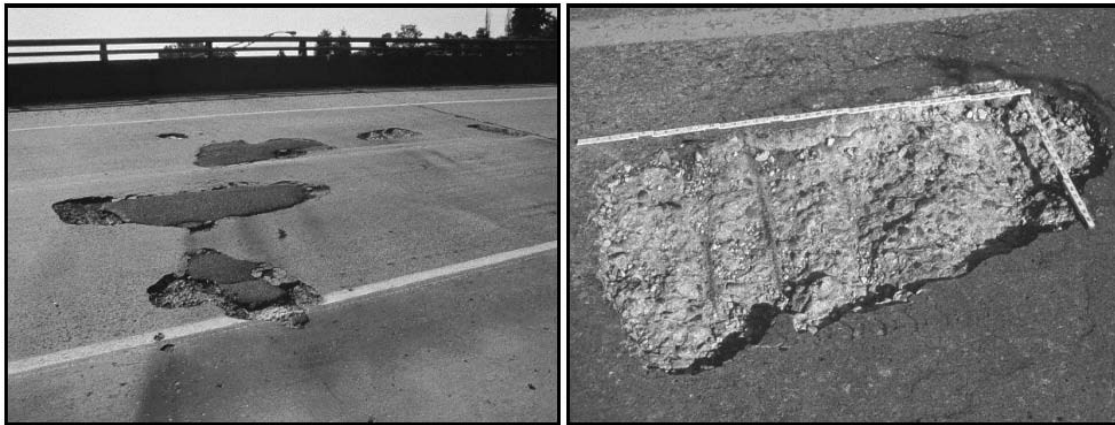
#1090) meets the criteria for Condition State 2. As the spalls (Defect #1080) are more than 1 in. deep, all of these areas (112 sq. ft. total) meet the criteria for Condition State 3, which controls.



**Figure B5.2: Spalls and distressed patches in Span 2 deck**

#### **B5.2.3 - Defect #3, Reinforced Concrete Deck (Element #12)**

1 in. to 2 in. deep spalls with exposed rebar (with no section loss) and areas of distressed patches in both lanes near midspan of Span 4, shown in Figure B5.3. The total area of spalls is 40 sq. ft.; the total area of distressed patches is 60 sq. ft. With no section loss, the exposed rebar (Defect #1090) meets the criteria for Condition State 2. As the spalls (Defect #1080) are more than 1 in. deep and the patches are not sound, all of these areas (100 sq. ft. total) meet the criteria for Condition State 3.



**Figure B5.3: Spalls and distressed patches in Span 4 deck**

#### **B5.2.4 - Defect #4, Compression Joint Seal (302) and Reinforced Concrete Deck (12)**

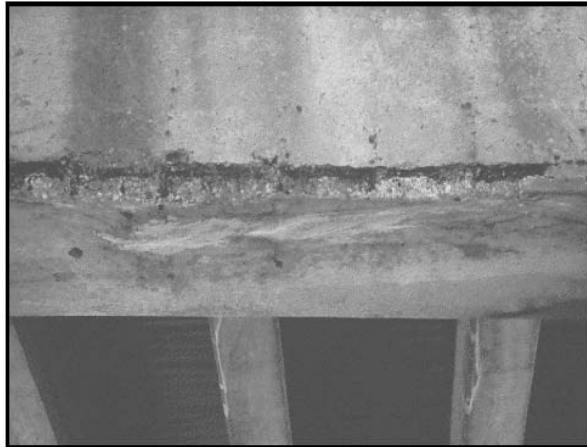
Deep spalls with un-sound concrete the full length (40 ft.) of the deck 6 in. adjacent to the joint seal at Pier 3, shown in Figure B5.4. The gland at this joint is also partially pulled out. For the joint element, the seal damage (Defect #2330) meets the criteria for Condition State 3, but the adjacent deck damage (Defect #2360) meets the criteria for Condition State 4, which controls. Due to their depth, the spalls (Defect #1080) in the concrete deck element in this area (40 ft. x 1 ft. = 40 sq. ft.) meet the criteria for Condition State Three.



**Figure B5.4: Deep spalls in the deck adjacent to the joint seal at Pier 3**

**B5.2.5 - Defect #5, Reinforced Concrete Pier Cap (Element #234)**

The underside of the Pier 2 cap has a spalled area 12 ft. long and 2 in. deep with exposed rebar and rust staining, shown in Figure B5.5. The depth of the spall (Defect #1080) meets the criteria to place this length of cap beam in Condition State Three. The section loss measured on the exposed rebar (Defect #1090) does not warrant a structural review of the cap beam and also meets the criteria for Condition State 3. Agency policy in this situation places a higher priority on the exposed rebar, making it the predominate defect.



**Figure B5.5: Spall, underside of Pier 2 cap**

**B5.2.6 - Defect #6, Reinforced Concrete Pier Cap (Element #234)**

Both the right and left cantilevers of the Pier 3 cap exhibit 0.04 in. wide cracks, some with rust staining, shown in Figure B5.6. This cracking extends for 2 ft. on the left side and for 4 ft. on the right. The widths of these cracks (Defect #1130) meet the criteria to place this quantity of the cap in Condition State 2, however the presence of efflorescence (Defect #1120) with rust staining meets the criteria for Condition State Three, which controls.



**Figure B5.6: 0.04 in. width cracks with rust staining in the cantilevers of the Pier 3 cap**

**B5.2.7 - Defect #7, Reinforced Concrete Column (Element #205)**

The left column of Pier 4 has a 3/16 in. wide by 11 ft. long vertical crack, shown in Figure B5.7. A previous structural review found that this crack does not affect the strength or serviceability of the element, thus the width of this crack (Defect #1130) meets the criteria to place this column in Condition State Three.



**Figure B5.7: 3/16 in. width vertical crack in left column of Pier 4**

### B.5.3 Element Quantity and Condition State Summary

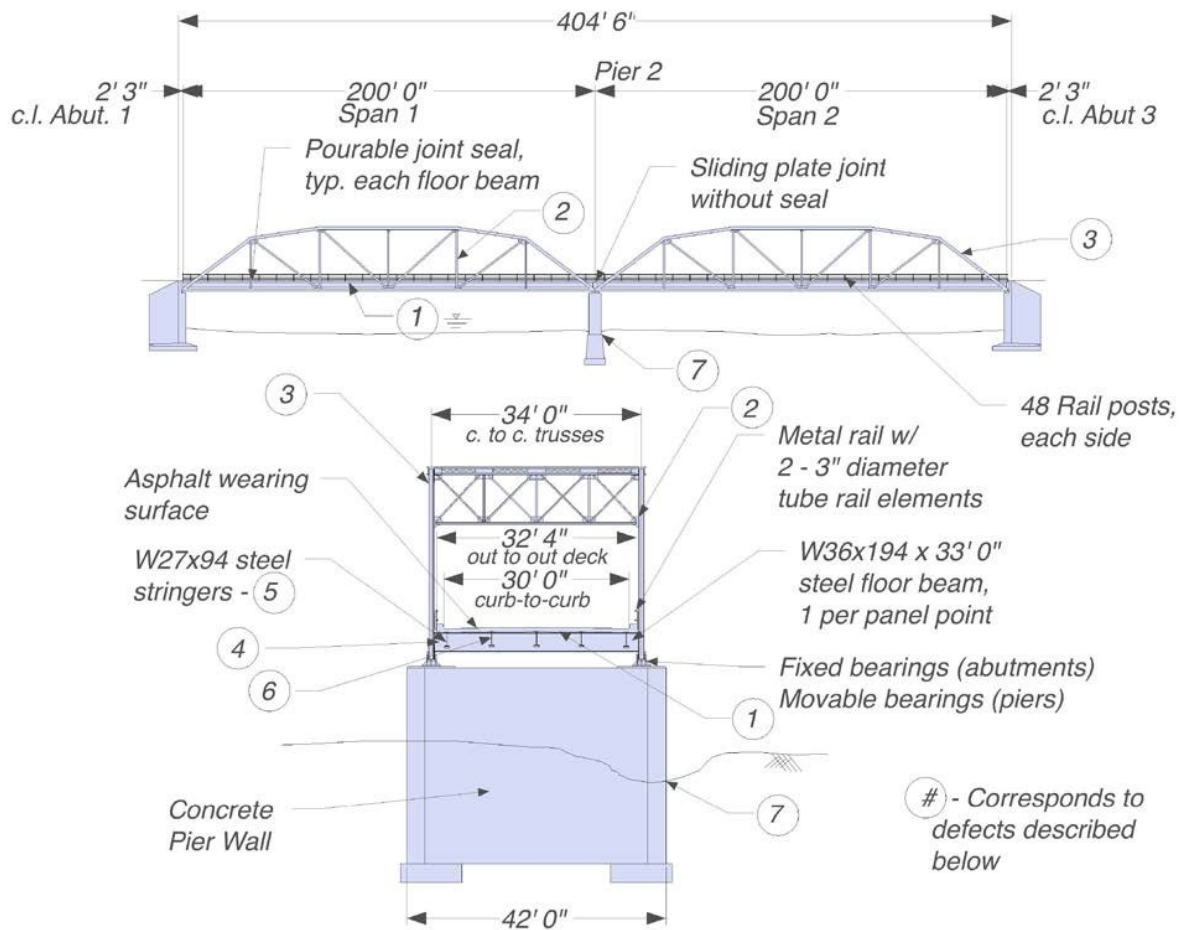
Element Number	Element Description	Unit of Measure	Total Quantity	CS1	CS2	CS3	CS4	Defect #
<b>12</b>	<b>Reinforced Concrete Deck</b>	<b>sq. ft.</b>	<b>11,880</b>	<b>11,628</b>	<b>0</b>	<b>252</b>	<b>0</b>	<b>1,2,3,4</b>
<i>1080</i>	<i>Delamination/Spall/ Patched Area</i>	<i>sq. ft.</i>	<i>252</i>	<i>0</i>	<i>0</i>	<i>252</i>	<i>0</i>	<i>2,3,4</i>
<b>301</b>	<b>Pourable Joint Seal</b>	<b>ft.</b>	<b>88</b>	<b>88</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>302</b>	<b>Compression Joint Seal</b>	<b>ft.</b>	<b>132</b>	<b>92</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>4</b>
<i>2360</i>	<i>Adjacent Deck or Header</i>	<i>ft.</i>	<i>40</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>40</i>	<i>4</i>
<b>330</b>	<b>Metal Bridge Railing</b>	<b>ft.</b>	<b>540</b>	<b>540</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>515</b>	<b>Steel Protective Coating</b>	<b>sq. ft.</b>	<b>1,726</b>	<b>1,726</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<del>331</del>	<del>Reinforced-Concrete Bridge Railing</del>	<del>ft.</del>	<del>540</del>	<del>540</del>	<del>0</del>	<del>0</del>	<del>0</del>	
<b>109</b>	<b>Prestressed Concrete Girder/Beam</b>	<b>ft.</b>	<b>2,144</b>	<b>2,144</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>310</b>	<b>Elastomeric Bearing</b>	<b>each</b>	<b>64</b>	<b>64</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>215</b>	<b>Reinforced Concrete Abutment</b>	<b>ft.</b>	<b>88</b>	<b>88</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>205</b>	<b>Reinforced Concrete Column</b>	<b>each</b>	<b>9</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>7</b>
<i>1130</i>	<i>Cracking (RC and Other)</i>	<i>each</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>7</i>
<b>234</b>	<b>Reinforced Concrete Pier Cap</b>	<b>ft.</b>	<b>132</b>	<b>114</b>	<b>0</b>	<b>18</b>	<b>0</b>	<b>5,6</b>
<i>1090</i>	<i>Exposed Rebar</i>	<i>ft.</i>	<i>12</i>	<i>0</i>	<i>0</i>	<i>12</i>	<i>0</i>	<i>5</i>
<i>1120</i>	<i>Efflorescence/ Rust Staining</i>	<i>ft.</i>	<i>6</i>	<i>0</i>	<i>0</i>	<i>6</i>	<i>0</i>	<i>6</i>

**Notes:**

Violet background: National Bridge Element  
 Blue background: Bridge Management Element  
*Bold italic type: Defect*

## B6 Steel Truss Bridge

The subject of this example is a two-span steel truss bridge crossing a river. The sketches in Figure B.6.1 show the bridge elements with relevant dimensions and note the locations of the defects described in the “Element Condition States” section below:



**Figure B6.1 – Elevation and typical section**

### B6.1 Element Quantities

#### B6.1.1 - Deck

The reinforced concrete deck has uncoated reinforcing steel and an asphalt wearing surface overlay.

Reinforced Concrete Deck (Element #12) Quantity: 404.50 ft. x 32.33 ft. = 13,077.49 sq. ft. (round up to 13,078 sq. ft.)

Wearing Surface (Element #510) Quantity: 404.50 ft. x 30 ft. = 12,135 sq. ft.



The metal railing has a concrete curb and metal posts. The metal railing members are painted – estimate the surface area of each metal post as 5 sq. ft.:

Metal Bridge Railing (Element #330) Quantity:  $404.50 \text{ ft.} \times (2 \text{ railing lines}) = 809 \text{ ft.}$   
Steel Protective Coating (Element #515) Quantity:  $[3.1416 \times 0.25 \text{ ft.}] \times (2 \text{ rails}) \times 404.50 \text{ ft.} + 5 \text{ sq. ft. per post} \times 48 \text{ posts}] \times (2 \text{ railing lines}) = 1,750.78 \text{ sq. ft. (round up to 1751 sq. ft.)}$

There are deck joints with pourable seals at 12 of the 14 floor beams. The sliding plate expansion joint at the pier does not have a seal. All joints extend from out-to-out of the deck. There is no skew:

Pourable Joint Seal (Element #301) Quantity:  $32.33 \text{ ft.} \times (12 \text{ joints}) = 388 \text{ ft.}$   
Assembly Joint Without Seal (Element #305) Quantity:  $32.33 \text{ ft.} \times (1 \text{ joint}) = 32.33 \text{ ft. (round up to 33 ft.)}$

### B6.1.2 - Superstructure

The main superstructure elements are the steel truss, floor beams and stringers. Each of these elements is painted:

Steel Truss (Element #120) Quantity:  $200 \text{ ft.} \times (2 \text{ trusses per span}) \times (2 \text{ spans}) = 800 \text{ ft.}$   
Steel Protective Coating (Element #515) Quantity: Calculated from “as-built” plans – 18,696 sq. ft.

Steel Floor Beam (Element #152) Quantity:  $33 \text{ ft.} \times (7 \text{ floor beams per span}) \times (2 \text{ spans}) = 462 \text{ ft.}$   
Steel Protective Coating (Element #515) Quantity:  $33 \text{ ft.} \times 8.9 \text{ sq. ft./ft.*} \times (14 \text{ floor beams}) = 4,112 \text{ sq. ft.}$

Steel Stringer (Element #113) Quantity:  $200 \text{ ft.} \times (5 \text{ stringers}) \times (2 \text{ spans}) = 2,000 \text{ ft.}$   
Steel Protective Coating (Element #515) Quantity:  $200 \text{ ft.} \times 6.8 \text{ sq. ft./ft.*} \times (5 \text{ stringers}) \times (2 \text{ spans}) = 13,600 \text{ sq. ft.}$

\* Surface area per foot length for W36x194 (floor beams) and W27x94 (stringers) steel sections are taken from the AISC Steel Design Guide 19 “Fire Resistance of Structural Steel Framing”, Appendix A, and does not include the surface area of the top face of the top flange.

There is a gusset plate assembly at each truss connection composed of two gusset plates (one on each side). All of the assemblies are painted – estimate the painted surface area of each gusset plate as 16 sq. ft.:

Steel Gusset Plate (Element #162) Quantity:  $(12 \text{ plate assemblies per span}) \times (2 \text{ trusses}) \times (2 \text{ spans}) = 48$

Steel Protective Coating (Element #515) Quantity:  $(48 \text{ assemblies}) \times (2 \text{ plates per assembly}) \times (16 \text{ sq. ft./plate}) = 1,536 \text{ sq. ft.}$

Each truss is supported on one movable bearing and one fixed bearing. The bearings are painted – estimate the painted surface area of each bearing as 12 sq. ft.:

Movable Bearing (Element #311) Quantity:  $(1 \text{ bearing per truss}) \times (2 \text{ trusses per span}) \times (2$

spans) = 4 bearings

Steel Protective Coating (Element #515) Quantity: (4 bearings) x (12 sq. ft./bearing) = 48 sq. ft.

Fixed Bearing (Element #313) Quantity: (1 bearing per truss) x (2 trusses per span) x (2 spans) = 4 bearings

Steel Protective Coating (Element #515) Quantity: (4 bearings) x (12 sq. ft./bearing) = 48 sq. ft.

### B.6.1.3 - Substructure

The reinforced concrete abutment distributes vertical load to the spread footing foundation and retains the approach embankment. The abutments are the same width as the pier wall.

Reinforced Concrete Abutment (Element #215) Quantity: 42 ft. x (2 abutments) = 84 ft.

The trusses are also supported on a reinforced concrete pier wall:

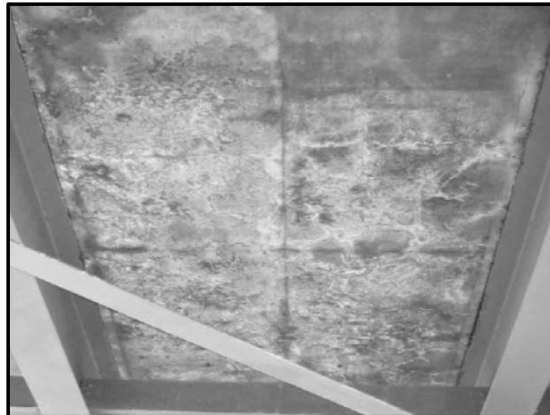
Reinforced Concrete Pier Wall (Element #215) Quantity: 42 ft. x (1 pier) = 42 ft.

## B6.2 Element Condition States

Aside from the defects described below, all element quantities are in good condition and assigned to Condition State 1. The following defects correspond to those labeled in Figure B6.1:

### B6.2.1 - Defect #1, Reinforced Concrete Deck (Element #12)

Moderate efflorescence (Defect #1120) is noted in the two interior deck bays throughout the length of Span 1 (affected area: 15 ft. x 200 ft. = 3000 sq. ft.), shown in Figure B6.2. Based on the extent of the efflorescence build-up and the lack of rust staining, these areas meet the criteria for Condition State 2. Cracks (Defect #1130) measuring 0.015 in. wide spaced at 1 ft. are also noted. The width and density of these cracks also meet the criteria for Condition State 2. Agency policy in this situation places a higher priority on the efflorescence, making it the predominant defect.



**Figure B6.2: Efflorescence on the underside of the deck in Span 1**

### B6.2.2 - Defect #2, Steel Truss (Element #120)

There is new impact damage to the sway bracing at panel point 4 in the Span 1 truss, resulting in a 1 in. distortion (Defect #7000) in the right side L4-U4 vertical member as shown in Figure B6.3. As the impact of this damage on the strength and serviceability of the truss is unknown, the length of the truss attributed to the vertical, measured parallel to the traveled way (1 ft.), is placed in Condition State 4.



**Figure B6.3: Sway bracing impact damage in Span 1**

### B6.2.3 - Defect #3, Steel Truss (120), Steel Gusset Pl. (162), Steel Prot. Coating (515)

Freckle rust throughout the length of both spans, both trusses as shown in Figure B6.4. As no section loss is measured, this corrosion (Defect #1000) results in the entire quantity of the steel truss and gusset plate elements being assigned to Condition State 2. The paint system throughout is chalking (Defect #3410), exhibiting loss of pigment and meeting the criteria for Condition State 3. The areas of paint where freckle rust is noted (estimated at 5% of the painted area, or 18,696 sq. ft. x 0.05 = 935 sq. ft. of the trusses and 1,536 sq. ft. x 0.05 = 77 sq. ft. of the gusset plates) have failed (Defect #3440), meeting the criteria for Condition State 4.



**Figure B6.4: Freckle rust, typical, both trusses, both spans**



#### B6.2.4 - Defect #4, Steel Floor Beam (152) and Steel Protective Coating (515)

Freckle rust throughout the length of all floor beams, thus the quantity of the steel floor beam element not showing further corrosion is assigned to Condition State 2. There is corrosion (Defect #1000) with less than 10% section loss in the top flange at 20 of the 28 beam ends, shown in Figure B6.5 which meets the criteria for Condition State 3. Each affected area will be considered to represent 2 feet of floor beam length (20 x 2 ft. = 40 ft. total). The paint system in these areas (approximately 2 sq. ft. per location, 20 x 2 sq. ft. = 40 sq. ft. total) has failed (Defect #3440) and is assigned to Condition State 4. The paint system throughout the rest of the beams is chalking (Defect #3410), exhibiting loss of pigment and meeting the criteria for Condition State 3. The areas of paint where freckle rust is noted (estimated at 5% of the painted area, or 4,112 sq. ft. x 0.05 = 206 sq. ft.) has also failed (Defect #3440), meeting the criteria for Condition State 4.



**Figure B6.5: Corrosion at floor beam ends**

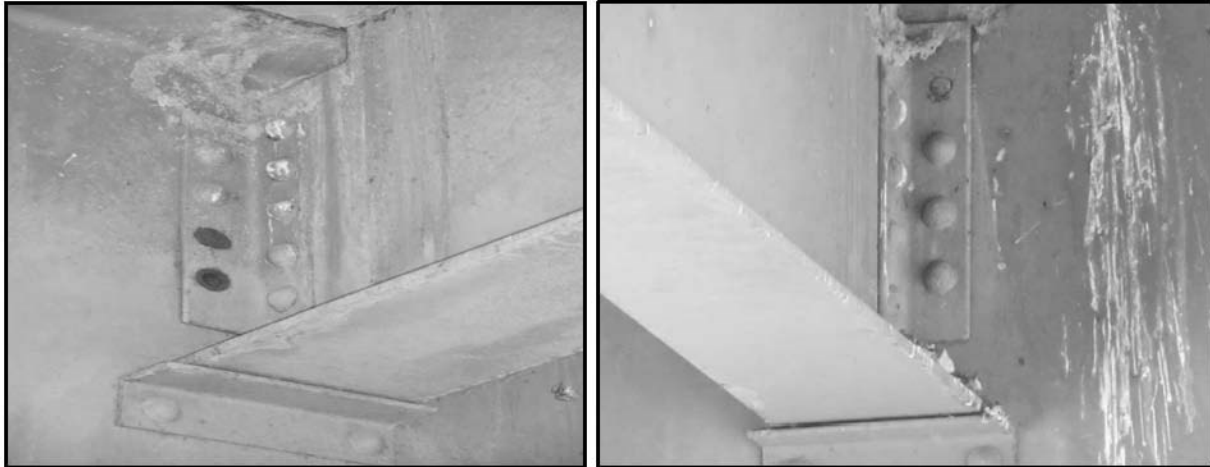
#### B6.2.5 - Defect #5, Steel Stringer (Element #113)

Freckle rust present near the floor beam connections, total length affected is 50 ft. As no section loss is evident, the corrosion (Defect #1000) in these areas meets the criteria for Condition State 2.

In these areas, the paint is chalking (Defect #3410), exhibiting loss of pigment and meeting the criteria for Condition State Three (total affected area is 50 ft. x 6.8 sq. ft./ft. = 340 sq. ft.). The areas of paint where freckle rust is noted (estimated at 5% of the affected area, or 340 sq. ft. x 0.05 = 17 sq. ft.) have failed (Defect #3440), meeting the criteria for Condition State Four.

#### B6.2.6 - Defect #6, Steel Stringer (Element #113)

Broken and missing rivets in 8 stringer-to-floor beam connections (Defect #1020), shown in Figure B6.6. Each affected connection will be considered to represent 1 foot of stringer length, or 8 x 1ft. = 8 ft. total. This condition led the inspector to assign these quantities to Condition State F4our in the field. However, a structural review of the floor system demonstrates that, despite the missing fasteners, the bridge can still carry legal loads and, per Agency policy, these quantities are reassigned to Condition State 3.



**Figure B6.6: Missing and broken fasteners at stringer-to-floor beam connections**

#### **B6.2.7 - Defect #7, Pier Wall (Element #210)**

There is a small scour hole (Defect #6000) extending 10 ft. in from the upstream end of the pier wall as shown in Figure B6.7. The measured scour is within the tolerable limits established by the bridge's scour evaluation, thus, the affected length meets the criteria for Condition State 2.



**Figure B-6.7: Scour hole at the upstream end of the Pier Wall**

### **B6.3 Element Quantity and Condition State Summary**

Element Number	Element Description	Unit of Measure	Total Quantity	CS1	CS2	CS3	CS4	Defect #
12	Reinforced Concrete Deck	sq. ft.	13,079	10,079	3,000	0	0	1
1120	<i>Efflorescence/ Rust Staining</i>	<i>sq. ft.</i>	<i>3,000</i>	<i>0</i>	<i>3,000</i>	<i>0</i>	<i>0</i>	<i>1</i>
510	Wearing Surface	sq. ft.	12,135	12,135	0	0	0	
330	Metal Bridge Railing	ft.	809	809	0	0	0	
515	Steel Protective Coating	sq. ft.	1,751	1,751	0	0	0	
301	Pourable Joint Seal	ft.	388	388	0	0	0	
305	Assembly Joint without Seal	ft.	33	33	0	0	0	
120	Steel Truss	ft.	800	0	799	0	1	2,3
1000	<i>Corrosion</i>	<i>ft.</i>	<i>800</i>	<i>0</i>	<i>799</i>	<i>0</i>	<i>0</i>	<i>3</i>
7000	<i>Damage</i>	<i>ft.</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>2</i>
515	Steel Protective Coating	sq. ft.	18,696	0	0	17,761	935	3
3410	<i>Chalking</i>	<i>sq. ft.</i>	<i>17,761</i>	<i>0</i>	<i>0</i>	<i>17,761</i>	<i>0</i>	<i>3</i>
3440	<i>Effectiveness</i>	<i>sq. ft.</i>	<i>935</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>935</i>	<i>3</i>
152	Steel Floor Beam	ft.	462	0	442	20	0	4
1000	<i>Corrosion</i>	<i>ft.</i>	<i>462</i>	<i>0</i>	<i>442</i>	<i>20</i>	<i>0</i>	<i>4</i>
515	Steel Protective Coating	sq. ft.	4,112	0	0	3,866	246	4
3410	<i>Chalking</i>	<i>sq. ft.</i>	<i>3,866</i>	<i>0</i>	<i>0</i>	<i>3,866</i>	<i>0</i>	<i>4</i>
3440	<i>Effectiveness</i>	<i>sq. ft.</i>	<i>246</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>246</i>	<i>4</i>
113	Steel Stringer	ft.	2,000	1,942	50	8	0	5,6
1000	<i>Corrosion</i>	<i>ft.</i>	<i>50</i>	<i>0</i>	<i>50</i>	<i>0</i>	<i>0</i>	<i>5</i>
1020	<i>Connections</i>	<i>ft.</i>	<i>8</i>	<i>0</i>	<i>0</i>	<i>8</i>	<i>0</i>	<i>6</i>
515	Steel Protective Coating	sq. ft.	13,600	13,260	0	323	17	5
3410	<i>Chalking</i>	<i>sq. ft.</i>	<i>323</i>	<i>0</i>	<i>0</i>	<i>323</i>	<i>0</i>	<i>5</i>
3440	<i>Effectiveness</i>	<i>sq. ft.</i>	<i>17</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>17</i>	<i>5</i>
162	Steel Gusset Plate	each	48	0	48	0	0	3
515	Steel Protective Coating	sq. ft.	1,536	0	0	1,459	77	3
3410	<i>Chalking</i>	<i>sq. ft.</i>	<i>1,459</i>	<i>0</i>	<i>0</i>	<i>1,459</i>	<i>0</i>	<i>3</i>
3440	<i>Effectiveness</i>	<i>sq. ft.</i>	<i>77</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>77</i>	<i>3</i>
311	Movable Bearing	each	4	4	0	0	0	
515	Steel Protective Coating	sq. ft.	48	48	0	0	0	
313	Fixed Bearing	each	4	4	0	0	0	
515	Steel Protective Coating	sq. ft.	48	48	0	0	0	

<b>Element Number</b>	<b>Element Description</b>	<b>Unit of Measure</b>	<b>Total Quantity</b>	<b>CS1</b>	<b>CS2</b>	<b>CS3</b>	<b>CS4</b>	<b>Defect #</b>
<b>215</b>	<b>Reinforced Concrete Abutment</b>	<b>ft.</b>	<b>84</b>	<b>84</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>210</b>	<b>Reinforced Concrete Pier Wall</b>	<b>ft.</b>	<b>42</b>	<b>32</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>7</b>
<i>6000</i>	<i>Scour</i>	<i>ft.</i>	<i>10</i>	<i>0</i>	<i>10</i>	<i>0</i>	<i>0</i>	<i>7</i>

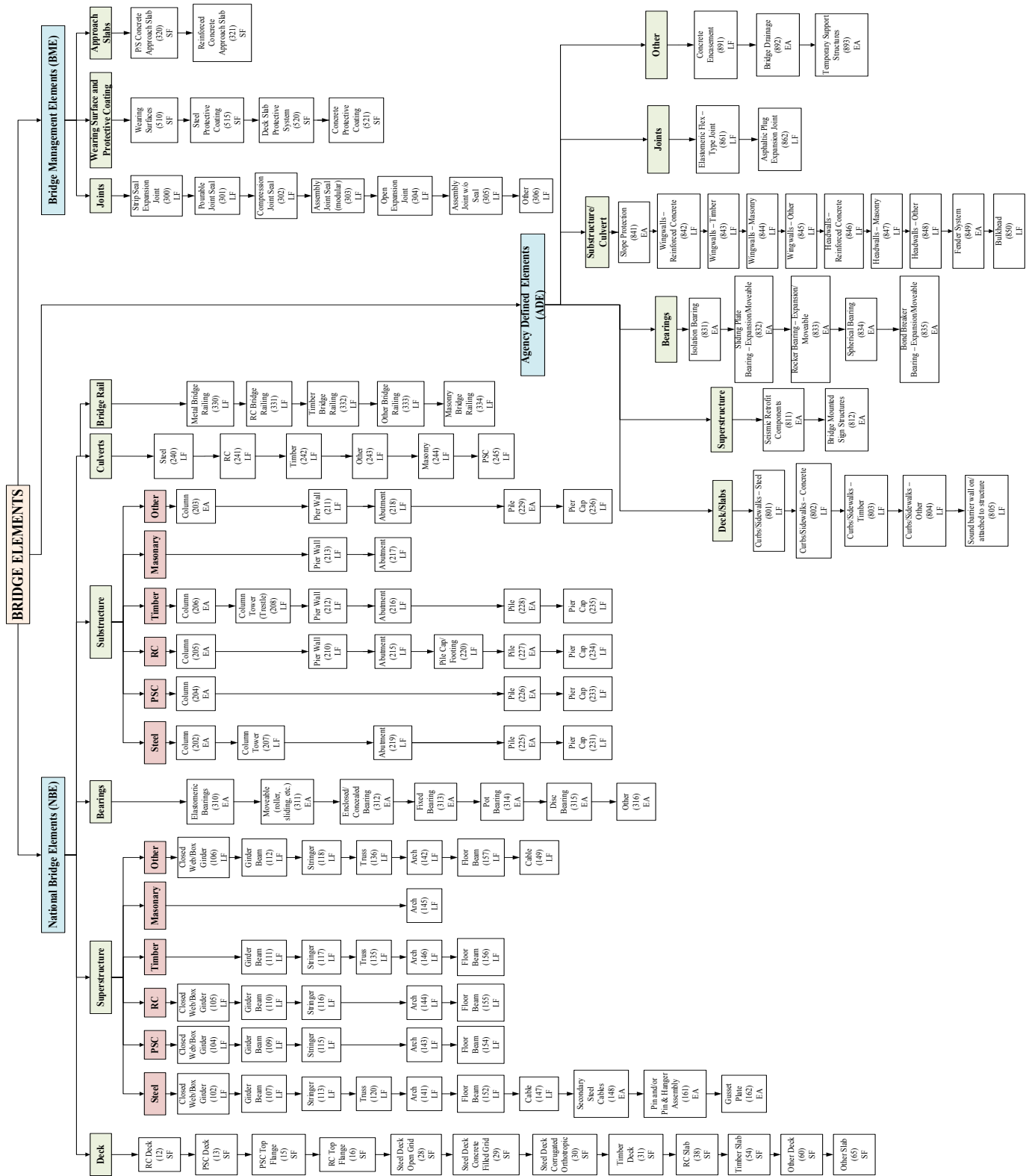
**Notes:**

Violet background: National Bridge Element  
Blue background: Bridge Management Element  
*Bold italic type: Defect*

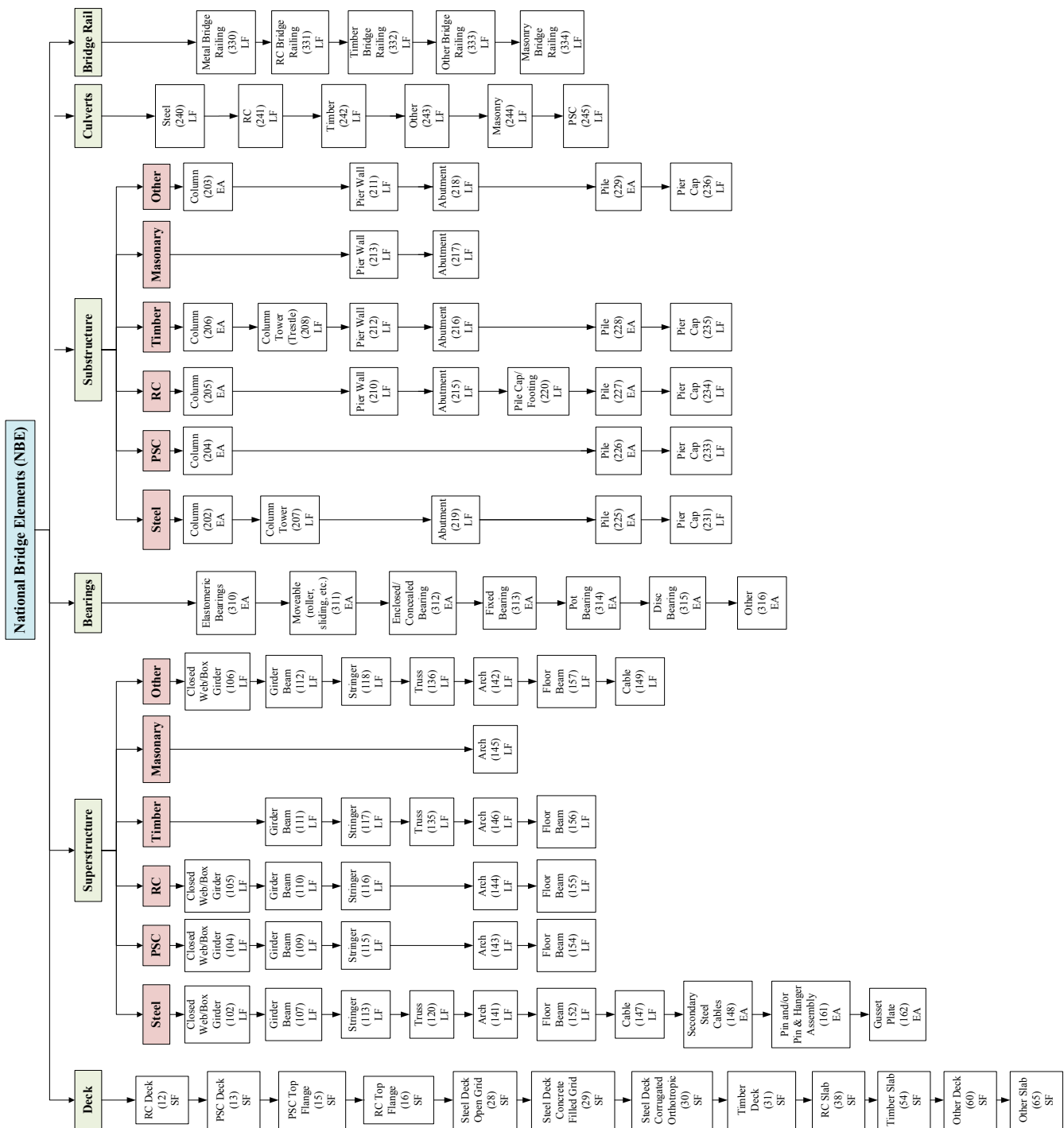
## Appendix C — NJDOT Element Groupings

The charts on the following pages organize the elements defined in this manual into National Bridge Elements, Bridge Management Elements, and Agency Defined Elements. For each element, the name, identifier and units of measure are shown, and elements are grouped by major bridge assembly and material type.

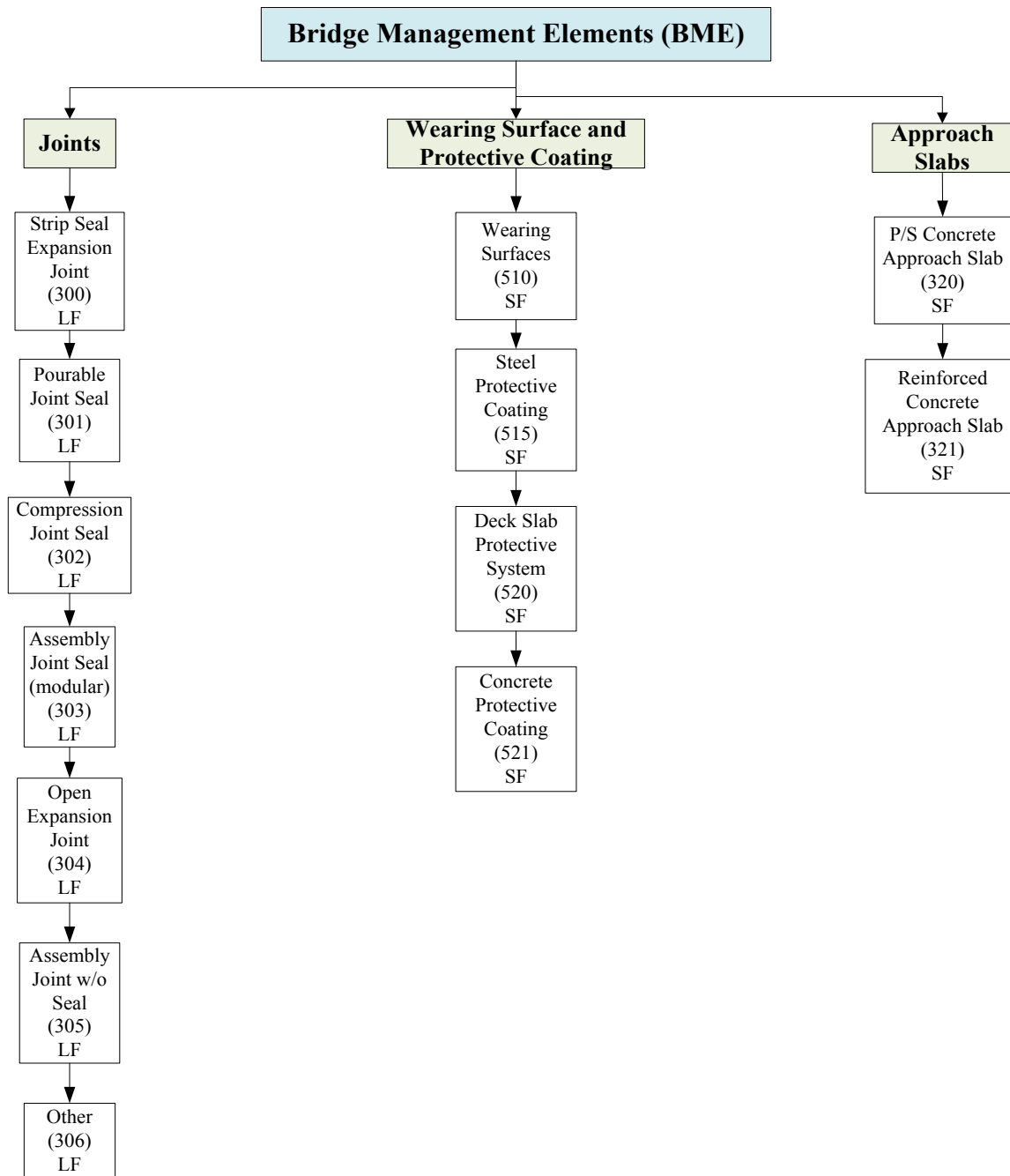
# C1 All NJDOT 2013 Bridge Elements



## C2 NJDOT National Bridge Elements

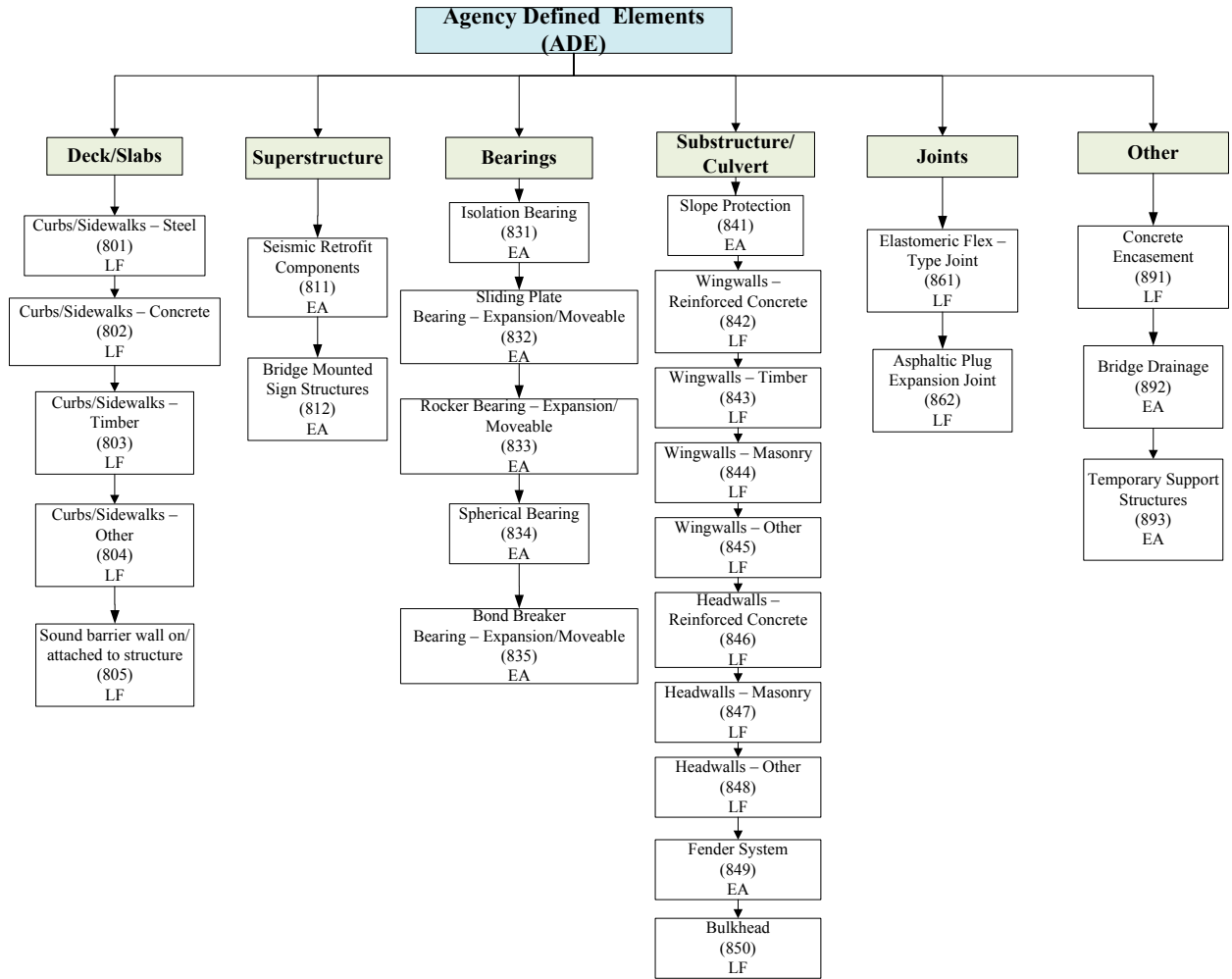


### C3 NJDOT Bridge Management Elements





## C4 NJDOT Agency Developed Elements



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## Appendix D —NJDOT Materials and Defects

This appendix describes the element materials defined for this specification and the defects that may be observed for each condition state. The materials include reinforced and prestressed concrete, steel, timber, masonry, other materials, and element types that are made of mixed materials or are not material based including joints, protective coatings, wearing surfaces, and deck protection systems. For each of these, the defects are identified with a unique defect code and conditions are described for each state. The primary intention of this appendix is to provide a roadmap of defined defects for each material, without considering the specific elements constructed of the material. Defect identification codes are provided for reference consistent with Appendix E. Section D.1 provides a list of the defects cross-tabulated with the materials for which the defects are defined. Defect condition state descriptions are detailed in section D.2.

The purpose of material defects is to detail the type of distress to the present element for management and tracking purposes. Condition state 1 quantifies the portion of element in good condition, element defects for this condition state typically are not listed.

## D1 Defect Definitions and Materials

Defect names and ID numbers in the following table correspond to the defects associated with each element definition in this manual.

<b>Defect</b>	<b>Definition</b>	<b>Materials</b>
Corrosion (1000)	This defect is used to report corrosion of metal and other material elements.	Steel/Metal, Other Materials
Cracking (1010)	This defect is used to report fatigue cracking in metal and other material elements.	Steel/Metal, Other Materials
Connection (1020)	This defect is used to report connection distress in metal and other material elements.	Steel/Metal, Timber, Other Materials
Delamination/ Spall/ Patched Area (1080)	This defect is used to report spalls, delamination and patched areas in concrete, masonry and other material elements.	PSC, RC, Masonry, Other Materials
Exposed Rebar (1090)	This defect is used to report exposed conventional reinforcing steel in reinforced and prestressed concrete elements.	PSC, RC
Exposed Prestressing (1100)	This defect is used to report exposed Prestressing steel in concrete elements.	PSC
Cracking (PSC) (1110)	This defect is used to report cracking in prestressed concrete elements.	PSC
Efflorescence/ Rust Staining (1120)	This defect is used to report Efflorescence/ Rust Staining in concrete and masonry elements.	PSC, RC, Masonry, Other Materials
Cracking (RC and Other) (1130)	This defect is used to report cracking in reinforced concrete and other material elements.	RC, Other Materials
Decay/ Section Loss (1140)	This defect is used to report decay (section loss) in timber elements.	Timber
Check/ Shake (1150)	This defect is used to report checks and shakes in timber elements.	Timber
Crack (Timber) (1160)	This defect is used to report cracking in timber elements.	Timber
Split/ Delamination (Timber) (1170)	This defect is used to report splits/delamination in timber elements.	Timber
Abrasion/ Wear (Timber) (1180)	This defect is used to report abrasion in timber elements.	Timber
Abrasion/ Wear (PSC/RC) (1190)	This defect is used to report Abrasion/ Wear in PSC and RC elements.	PSC, RC
Deterioration (Other) (1220)	This defect is used to report general deterioration in elements constructed of other materials such as fiber reinforced	Other Materials

<b>Defect</b>	<b>Definition</b>	<b>Materials</b>
	plastics or similar.	
Mortar Breakdown (Masonry) (1610)	This defect is used to report breakdown of masonry mortar between brick, block or stone.	Masonry
Split/ Spall (Masonry) (1620)	This defect is used to report splits or spalls in brick, block or stone.	Masonry
Patched Area (Masonry) (1630)	This defect is used to report masonry patched areas.	Masonry
Masonry Displacement (1640)	This defect is used to report displaced brick, block or stone.	Masonry
Distortion (1900)	This defect is used to report distortion from the original line or grade of the element. It is used to capture all distortion regardless of cause.	Steel/Metal, PSC, RC, Masonry, Timber, Other Materials
Movement (2210)	This defect is used to report movement of bridge bearing elements.	Other Materials
Alignment (2220)	This defect is used to report alignment of bridge bearing elements.	Other Materials
Bulging, Splitting or Tearing (2230)	This defect is used to report bulging, splitting or tearing of elastomeric bearing elements.	Other Materials
Loss of Bearing Area (2240)	This defect is used to report the loss of bearing area for bridge bearing elements.	Other Materials
Leakage (2310)	This defect is used to report leakage through or around sealed bridge joints.	Other Materials
Seal Adhesion (2320)	This defect is used to report loss of adhesion in sealed bridge joints.	Other Materials
Seal Damage (2330)	This defect is used to report damage to the rubber in bridge joint seals.	Other Materials
Seal Cracking (2340)	This defect is used to report cracking in the rubber in bridge joint seals.	Other Materials
Debris Impaction (2350)	This defect is used to report the accumulation of debris in bridge joint seals that may or may not affect the performance of the joints.	Other Materials
Adjacent Deck or Header (2360)	This defect is used to report concrete deck damage in the area anchoring the bridge joint.	Other Materials
Metal Deterioration or Damage (2370)	This defect is used to report metal damage or deterioration in the bridge joint.	Other Materials
Delamination/ Spall/ Patched Area/Pothole (Wearing Surfaces) (3210)	This defect is used to report spalls, delamination, patched areas and potholes in wearing surface elements.	Wearing Surfaces

<b>Defect</b>	<b>Definition</b>	<b>Materials</b>
Crack (Wearing Surface) (3220)	This defect is used to report cracking in wearing surface elements.	Wearing Surfaces
Effectiveness (Wearing Surface) (3230)	This defect is used to the loss of effectiveness in the protection provided to the deck by the wearing surface elements.	Wearing Surfaces
Chalking (Steel Protective Coatings) (3410)	This defect is used to report chalking in metal protective coatings.	Steel/Metal Protective Coatings
Peeling/Bubbling/Cracking (Steel Protective Coatings) (3420)	This defect is used to report peeling, bubbling or cracking in metal protective coatings.	Steel/Metal Protective Coatings
Oxide Film Degradation Color/ Texture Adherence (Steel Protective Coatings) (3430)	This defect is used to report oxide film degradation of texture in metal protective coatings.	Steel/Metal Protective Coatings
Effectiveness (Steel Protective Coatings) (3440)	This defect is used to report the loss of effectiveness of metal protective coatings.	Steel/Metal Protective Coatings
Wear (Concrete Protective Coatings) (3510)	This defect is used to report the wearing of concrete protective coatings.	Concrete Protective Coatings
Chalking (Concrete Protective Coatings) (3520)	This defect is used to report chalking of concrete protective coatings.	Concrete Protective Coatings
Peeling/ Bubbling/ Cracking (Concrete Protective Coatings) (3530)	This defect is used to report peeling/bubbling/cracking of concrete protective coatings.	Concrete Protective Coatings
Effectiveness (Concrete Protective Coatings) (3540)	This defect is used to report the effectiveness of concrete protective coatings.	Concrete Protective Coatings
Effectiveness - Protective System (e.g. cathodic) (3600)	This defect is used to report the effectiveness of internal concrete protective systems (epoxy rebar, cathodic protection etc.).	Concrete Reinforcing Steel Protective Systems
Settlement (4000)	This defect is used to report settlement in substructure elements.	Steel/Metal, PSC, RC, Masonry, Timber, Other Materials
Scour (6000)	This defect is used to report scour in substructure elements.	Steel/Metal, PSC, RC, Masonry, Timber, Other Materials
Damage (7000)	This defect is used to capture impact damage that has occurred.	Steel/Metal, PSC, RC, Masonry, Timber, Other Materials, Wearing Surfaces, Steel/Metal Protective Coatings, Concrete Protective

<b>Defect</b>	<b>Definition</b>	<b>Materials</b>
		Coatings, Concrete Reinforcing Steel Protective Systems
Erosion /Undermining (Slope Protection) (8001)	This defect is to capture erosion or undermining beneath the slope protection for substructure units.	RC, Masonry, Other Materials
Clogging (Bridge Drainage) (8002)	This defect is to capture the clogging of inlets, down spouts or pipes for proper water drainage.	Steel/Metal, RC, Other Materials
Leakage (Bridge Drainage) (8003)	This defect is to capture the leaking of down spouts or pipes so that damage to primary member(s) can be avoided.	Steel/Metal, RC, Other Materials
Settlement (Curbs/ Sidewalk) (8004)	This defect is used to capture settlement in curbs and sidewalk elements.	Steel/Metal, RC, Timber, Other Materials
Cracking/ Displacement/ Missing Mortar/ Broken slab (Slope Protection) (8005)	This defect is used to capture cracking, displacement, missing mortar, and broken slabs in slope protection elements.	RC, Masonry, Other Materials

## D2 Materials and Defect Condition State Descriptions

Defect condition state language in the following tables corresponds to the descriptions associated with each element definition documented in Chapter 3.

### D2.1 Steel (100)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective counter-measures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	



Defect	Condition States			
	1	2	3	4
	<b>GOOD</b>	<b>FAIR</b>	<b>POOR</b>	<b>SEVERE</b>
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

## D2.2 Prestressed Concrete (300)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination / Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None.	Present without section loss.	Present with section loss, but does not warrant structural review.	
Cracking (PSC) (1110)	<del>Width less than 0.004 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.004-0.009 in. or spacing of 1.0-3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.009 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Distortion (1900)	None	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None	Exists within tolerable limits or has been arrested with effective counter-measures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### **Element Commentary**

The inspector should use judgment when utilizing the condition state defect definitions, especially for prestressed concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, prestressed concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate and cracks greater than 0.009 inches can be considered wide.

## D2.3 Reinforced Concrete (400)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Abrasion/ Wear (PSC/RC) (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective counter-measures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### **Element Commentary**

The inspector should use judgment when utilizing the condition state defect definitions, especially for reinforced concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

## D2.4 Timber (500)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay/ Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check/ Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (Timber) (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review	
Split/ Delamination (Timber) (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion/ Wear (Timber) (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective counter-measures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

## D2.5 Other Materials (600)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Delamination/ Spall/ Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (RC and Other) (1130)	<del>Width less than 0.012 in. or spacing greater than 3.0 ft.</del> Insignificant cracks or moderate width cracks that have been sealed.	<del>Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.</del> Unsealed moderate width cracks or unsealed moderate pattern (map) cracking.	<del>Width greater than 0.05 in. or spacing of less than 1 ft.</del> Wide crack or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	



Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion.	Complete loss of adhesion.
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking (2340)	None.	Surface crack.	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended.
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning.	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective counter-measures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

### **Element Commentary**

The inspector should use judgment when utilizing the condition state defect definitions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation and structural or nonstructural nature of cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate and cracks greater than 0.05 inches can be considered wide.

## D2.6 - Masonry (650)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Efflorescence/ Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Mortar Breakdown (Masonry) (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Split/ Spall (Masonry) (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Area (Masonry) (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective counter-measures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

## D2.7 Wearing Surfaces (800)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Delamination/ Spall/ Patched Area/Pothole (Wearing Surfaces) (3210)	None	Delaminated. Spall less than 1 in. deep or less than 6 in. diameter. Patched area that is sound. Partial depth pothole.	Spall 1 in. deep or greater or 6 in. diameter or greater. Patched area that is unsound or showing distress. Full depth pothole.	The wearing surface is no longer effective.
Crack (Wearing Surface) (3220)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width of more than 0.05 in. or spacing of less than 1.0 ft.	
Effectiveness (Wearing Surface) (3230)	Fully effective. No evidence of leakage or further deterioration of the protected element.	Substantially effective. Deterioration of the protected element has slowed.	Limited effectiveness. Deterioration of the protected element has progressed.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	
				The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

## D2.8 Concrete Reinforcing Steel Protective Systems (820)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Effectiveness - Protective System (e.g. cathodic) (3600)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

## D2.9 Steel Protective Coatings (850)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Chalking (Steel Protective Coatings) (3410)	None.	Surface Dulling.	Loss of Pigment.	Not Applicable.
Peeling/Bubbling/ Cracking (Steel Protective Coatings) (3420)	None.	Finish coats only.	Finish and primer coats.	Exposure of bare metal.
Oxide Film Degradation Color/ Texture Adherence (Steel Protective Coatings) (3430)	Yellow-orange or light brown for early development. Chocolate-brown to purple-brown for fully developed. Tightly adhered, capable of withstanding hammering or vigorous wire brushing.	Granular texture.	Small flakes, less than 1/2 in. diameter.	Dark black color. Large flakes, 1/2 in. diameter or greater or laminar sheets or nodules.
Effectiveness (Steel Protective Coatings) (3440)	Fully effective.	Substantially effective.	Limited effectiveness.	Failed, no protection of the underlying metal.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.



## D2.10 Concrete Protective Coatings (880)

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Wear (Concrete Protective Coatings) (3510)	None.	Underlying concrete not exposed, coating is showing wear from UV exposure, friction course missing.	Underlying concrete is not exposed; thickness of the coating is reduced.	Underlying concrete exposed. Protective coating no longer effective.
Effectiveness (Concrete Protective Coatings) (3540)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in Condition State 4 under the appropriate material defect entry.

## D2.11 Slope Protection

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Erosion/ Undermining (Slope Protection) (8001)	None.	Exists within tolerable limits or has been arrested with effective drainage system.	Exceeds tolerable limits but is less than the critical limits determined by slope stability evaluation and does not warrant geotechnical or structural review.	The condition warrants a geotechnical and/or geotechnical review to determine the effect on strength or serviceability of the element or bridge; OR a geotechnical and/or structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking/ Displacement/ Missing Mortar/ Broken slab (Slope Protection) (8005)	Insignificant defects or moderate width cracks that have been sealed.	Unsealed moderate width cracks or displacement/missing mortar/broken slab affecting less than one-third of the area.	Unsealed severe width cracks or displacement/missing mortar/broken slab affecting more than one-third of the area.	

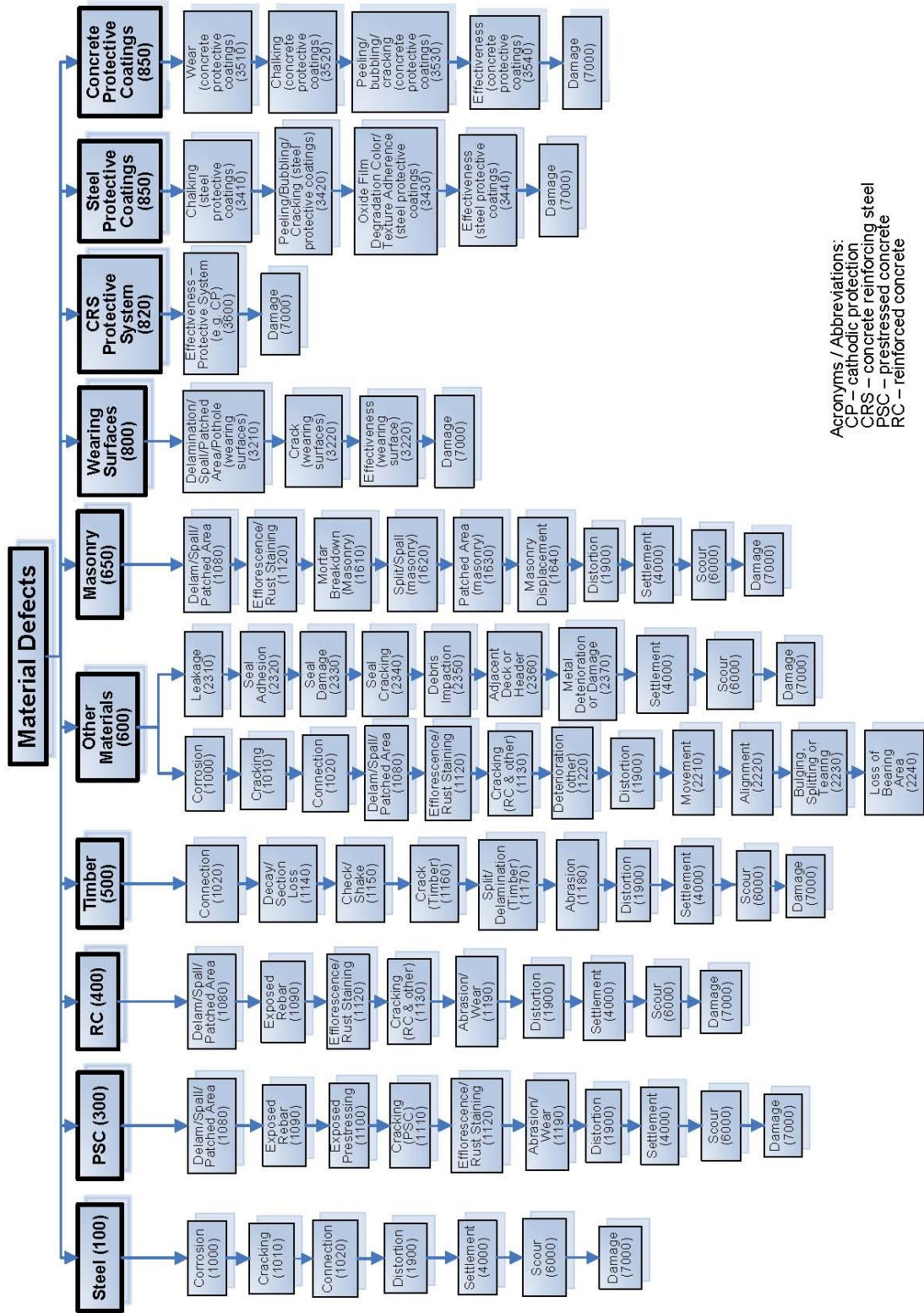
## D2.12 Bridge Drainage

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Clogging (Bridge Drainage) (8002)	None.	Minimal. Inlets and pipes clogged for less than 10% area. No water accumulation.	Moderate. Not more 25% area clogged in inlets and pipes. No water accumulation. Does not warrant bridge drainage review.	Failed. 100% area of inlets and pipes clogged. Water accumulation is present. The condition warrants detailed review of Bridge Drainage System.
Leakage (Bridge Drainage) (8003)	None.	Minimal. Minor dripping through the down spouts or pipes without damaging the primary member.	Moderate. More than a drip and less than free flow of water through down spouts, pipes or joints without damaging the primary member.	Failed. Water leakage is damaging the primary member. The condition warrants detailed review of the Bridge Drainage System.

## D2.13 Curbs/Sidewalks

Defects	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
Settlement (Curbs/Sidewalk) (8004)	None.	Minor	Moderate, but does not warrant maintenance review.	The condition warrants a maintenance review to determine the effectiveness of sidewalk and curbs on the bridge; OR a maintenance review has been completed.

# D3 Graphical Material Defects



Acronyms / Abbreviations:  
 CP – cathodic protection  
 CRS – concrete reinforcing steel  
 PSC – prestressed concrete  
 RC – reinforced concrete

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## Appendix E —NJDOT Materials and Feasible Actions

This appendix describes the element materials defined for this specification and the feasible actions that may be applied for each condition state. The materials include reinforced and prestressed concrete, steel, timber, masonry, other materials, and element types that are made of mixed materials or are not material based including joints, protective coatings, wearing surfaces, and deck protection systems. For each of these, the feasible actions are listed at a high level, with the understanding that NJDOT practices will differ in scope and detail. The primary intention is to provide a roadmap of possible actions scaled by distress or defect severity with the assumption that needed work for all elements constructed of these materials or in an element family may be addressed by one or more of these common feasible actions. Material identification codes are provided for reference consistent with Appendix D.

### E1 Steel (100)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E2 Prestressed Concrete (300)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E3 Reinforced Concrete (400)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E4 Timber (500)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace



### E5 Other Materials (600)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E6 Masonry (650)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E7 Wearing Surfaces (800)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E8 Concrete Reinforcing Steel Protective Systems (820)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E9 Steel Protective Coatings (850)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E10 Concrete Protective Coatings (880)

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E11 Slope Protection

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

### E12 Bridge Drainage

Feasible Actions	Condition States			
	1	2	3	4
	GOOD	FAIR	POOR	SEVERE
	Do Nothing	Do Nothing	Do Nothing	Do Nothing
	Protect	Protect	Protect	Protect
		Repair	Repair	Repair
			Rehabilitate	Rehabilitate
			Replace	Replace

## Appendix F —NJDOT Guidelines for Quantity Measurement

This appendix describes some examples of estimating quantities. Also, it includes sketches for different types of bearing and joints.

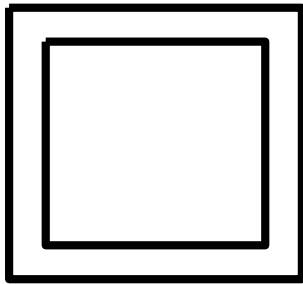
### F1 Estimating Total Quantities

In most cases, quantities of elements are estimated based on the number of elements multiplied by the length or width of the bridge. For example, if there are 10 floor beams on a structure and the bridge is 40 feet wide, you can estimate the total quantity as  $10 \times 40' = 400'$ . The estimated quantities must be checked for accuracy during the first element level inspection. After field verification, the quantities will be accurate, unless a physical change is made to the bridge. Note that it is **not** required to be exact for the quantities; just to be close ( $\pm 1\%$ ) is sufficient.

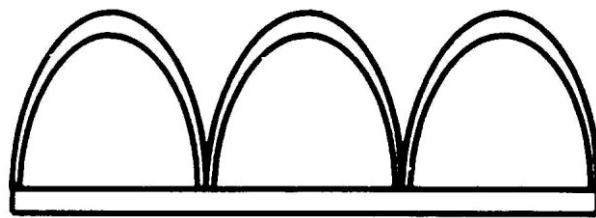
### F2 Element Determination

#### F2.1 Culverts

The quantity for culverts will be the length of the barrel (measured from headwall to headwall) multiplied by the number of barrels. For example if you have a 2 barrel culvert that is 75' long, the total length of the culvert is  $75' \times 2 = 150'$ .



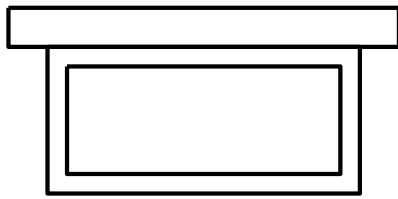
Quantity = 1 x Barrel Length



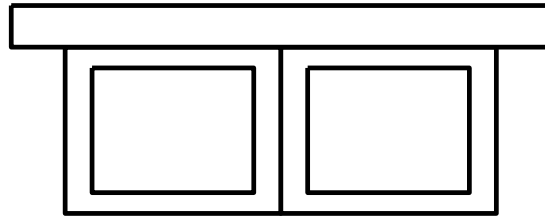
Quantity = 3 x Barrel Length

#### F2.2 Box Girders

The quantity for box girder depends on the number of boxes which make up the girder. The quantity will be the number of "barrels" multiplied by the bridge length. See the following guideline:



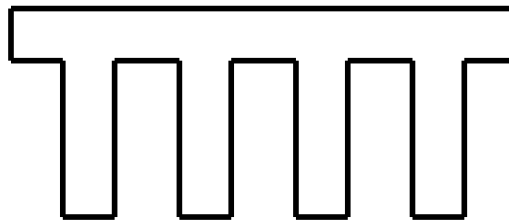
Quantity = 1 x Length



Quantity = 2 x Length

### F2.3 Integral Deck Girders

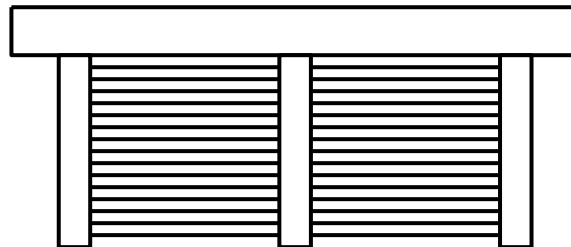
For this type of bridge include both an element for girder as well as one for deck. Because the deck acts integrally as part of the girder, if the deck is bad the girder should be rated down.



Quantity = 4 x Length

### F2.4 Timber Abutments

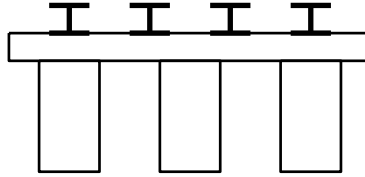
These types of abutments typically will get 3 different elements, a timber cap, timber column, and timber abutment. The timber abutment in these cases will consist only of the back wall of the abutment.



Quantity: timber piles = 3, timber cap = 1 x width, timber abutment = 1 x width

### F2.5 Pile Bent Pier

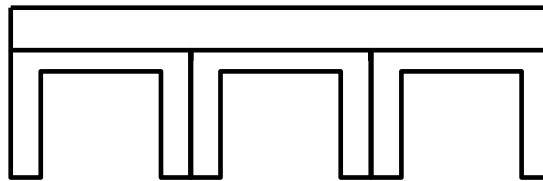
These piers will have two elements, a cap and columns. Any diagonal bracing will not be considered in rating the condition of the columns.



Quantity: columns = 3, cap = 1 x width

### F2.6 Concrete Channels

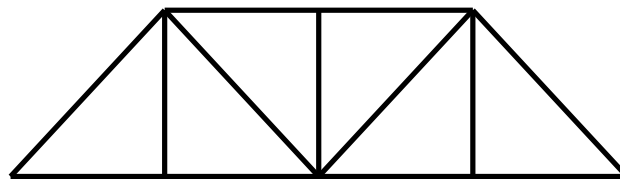
These elements are precast channels with normal reinforcement (not prestressed). Record these elements as a reinforced concrete girder, and also include the deck as a separate element. One channel is counted as a quantity of 1 times the length.



Quantity = 3 x length

### F2.7 Trusses

These are recorded as the number of lineal feet on each side of the bridge. Diagonals, verticals or cross bracing are not counted as additional quantities.



Quantity = 2 x length (one for each side of the bridge)

## F2.8 Stringers/Floor beams/Girders

Stringers are the small elements which run longitudinally to the deck and carry the load from the deck to the floor beams. Floorbeams are transverse to the deck and carry the stringer load out to the truss or girders. Girders are the main longitudinal superstructure members which carry the loads to the substructures.

### Stringers

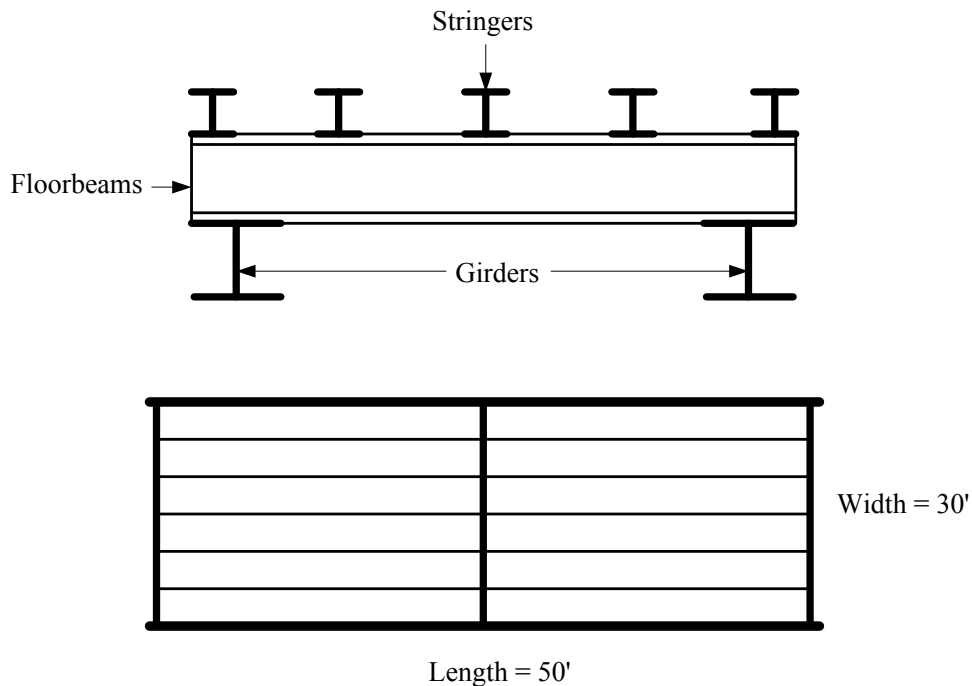
Quantity = length x number of stringers = 50' x 5 = 250 LF

### Floorbeams

Quantity = width x number of floorbeams = 30' x 3 = 90 LF

### Girders

Quantity = length x number of girders = 50' x 2 = 100 LF



## F2.9 Conventions for Quantities

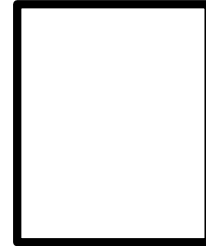
1. Quantity for Culverts is the length of the barrel (measured headwall to headwall) times the number of barrels.
2. Quantity for Abutments is measured along the entire face of the abutment and back along the wing to the first vertical joint of each wingwall. If the wingwall is integral, you would measure the face of the abutment and the entire length of the wingwall.
3. Quantity for Box Girders is the number of cells times the bridge length.
4. Quantity for Railing is the length of each railing measured from backwall to backwall.
5. Quantity for Pier Walls is from the outside edge to outside edge of pier wall. Use the pier wall element anytime the pier supporting member is 10 feet or greater in width.
6. Quantity for Arch is not measured along the length of the barrel. It is measured along the span length from spring line to spring line in one foot increments. (Frames are also included in this category).
7. Quantity for Truss is measured in linear feet along the truss (a horizontal projection of the measurement). Do not add web member lengths.
8. Quantity for Deck is measured in square footage. This total is obtained by using the out-to-out (fascia to fascia) and structure length dimensions.
9. Quantity for Beams and Girders is measured from beam or girder end to beam or girder end, not bearing to bearing.

### F3 Example for Element 102: Steel Close Web/Box Girder

Steel Closed Box Girder

#### F3.1 Example 1: Steel Closed Box Girder

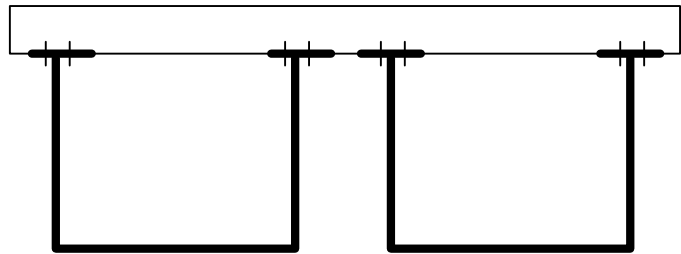
Quantity = (visible web faces / 2) x length = (2/2) x 50 = 50 LF



Length = 50'

#### F3.2 Example 2: Steel Spread Closed Web Girder

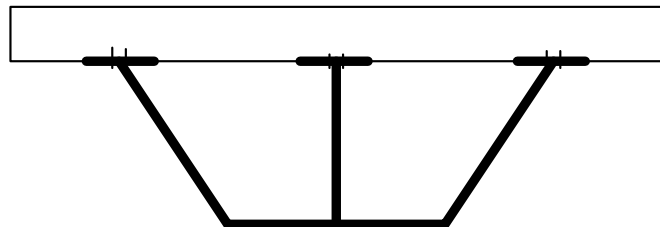
Quantity = (visible web faces / 2) x length = (4/2) x 50 = 100 LF



Length = 50'

#### F3.3 Example 3: Steel Closed Web Girder

Quantity = (visible web faces / 2) x length = (2/2) x 50 = 50 LF

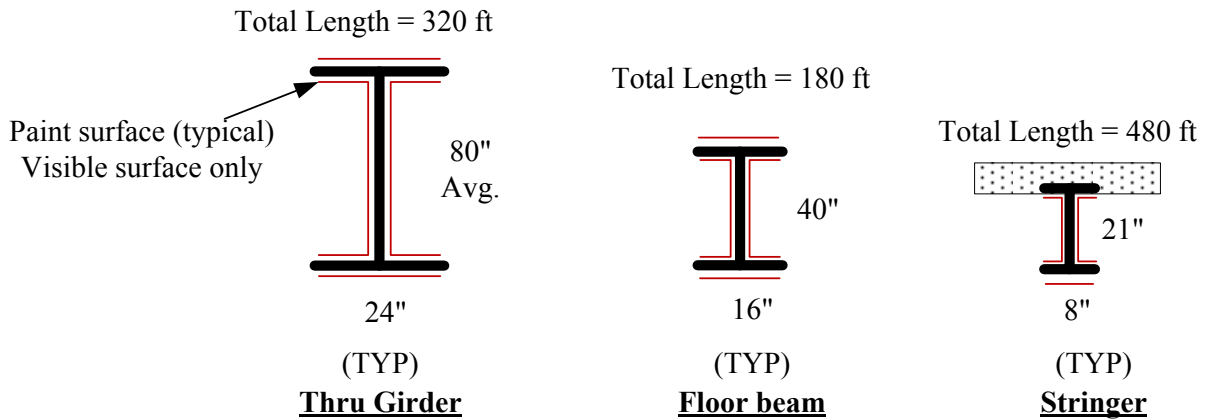


Length = 50'



## F4 Example for Element 515: Steel Protective Coating

### F4.1 Example 1: Protective Coating for a Thru Girder-Floor beam-Stringer system.

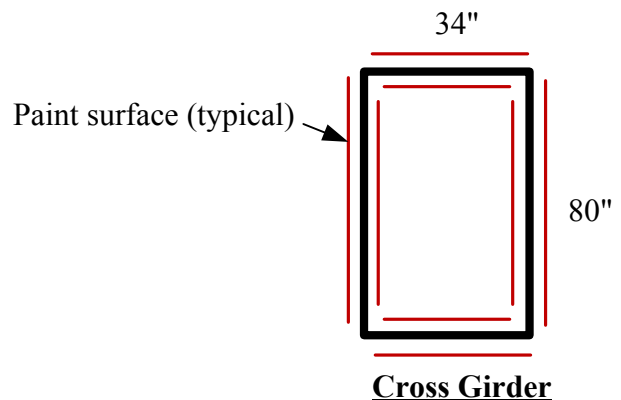


Element	Calculations	Area/Lengt h SF/LF	Length (LF)	Total (SF)
Stringers	$(4 + 21 + 4 + 8 + 4 + 21 + 4) / 12 = 5.50$	5.50 SF/LF	480	2,640
Floorbeams	$(8 + 40 + 8 + 16 + 8 + 40 + 8 + 16) / 12 = 10.67$	12.00 SF/LF	180	2,160
Thru Girders	$(12 + 80 + 12 + 24 + 12 + 80 + 12 + 24) / 12 = 21.33$	21.33 SF/LF	320	6,827

### F4.2 Example 2: Steel Protective Coating for Cross Girder

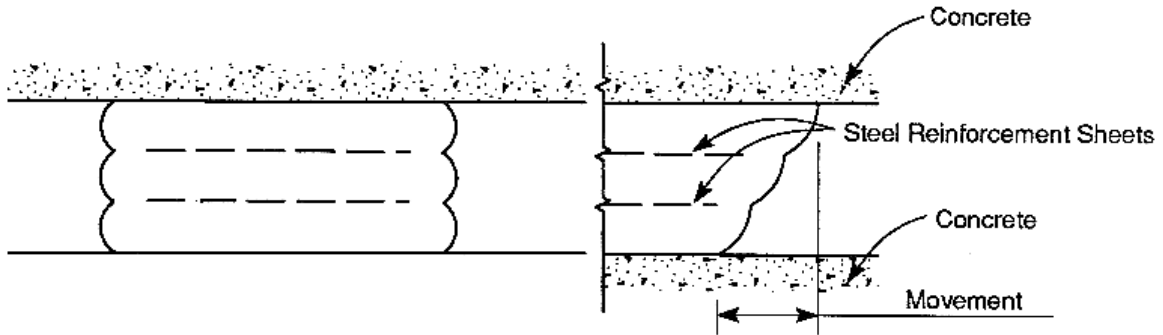
Length = 50 LF

$$\begin{aligned} \text{Quantity} &= [(80 + 34 + 80 + 34) / 12] \times 2 \times 50 \\ &= 19 \times 2 \times 50 \\ &= 1900 \text{ SF} \end{aligned}$$

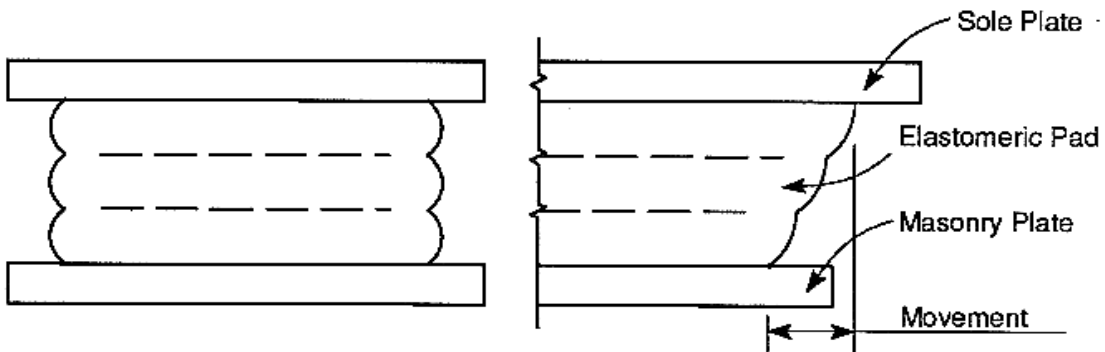


## F5 Examples of Bearing Types

### F5.1 Elastomeric Bearing, Element No. 310

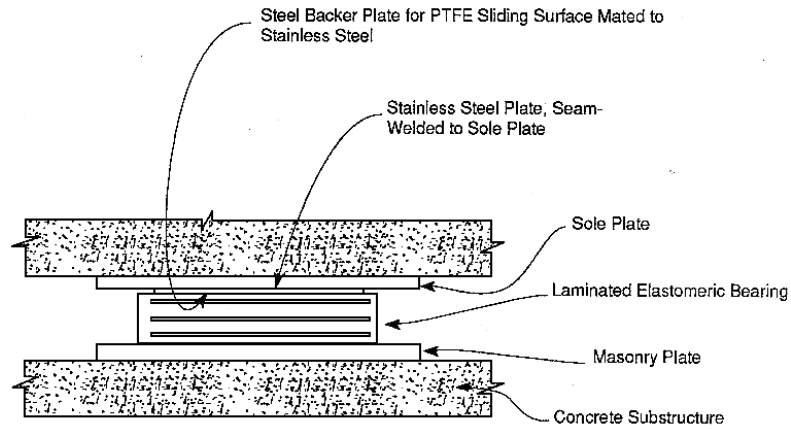


Elastomeric Pads



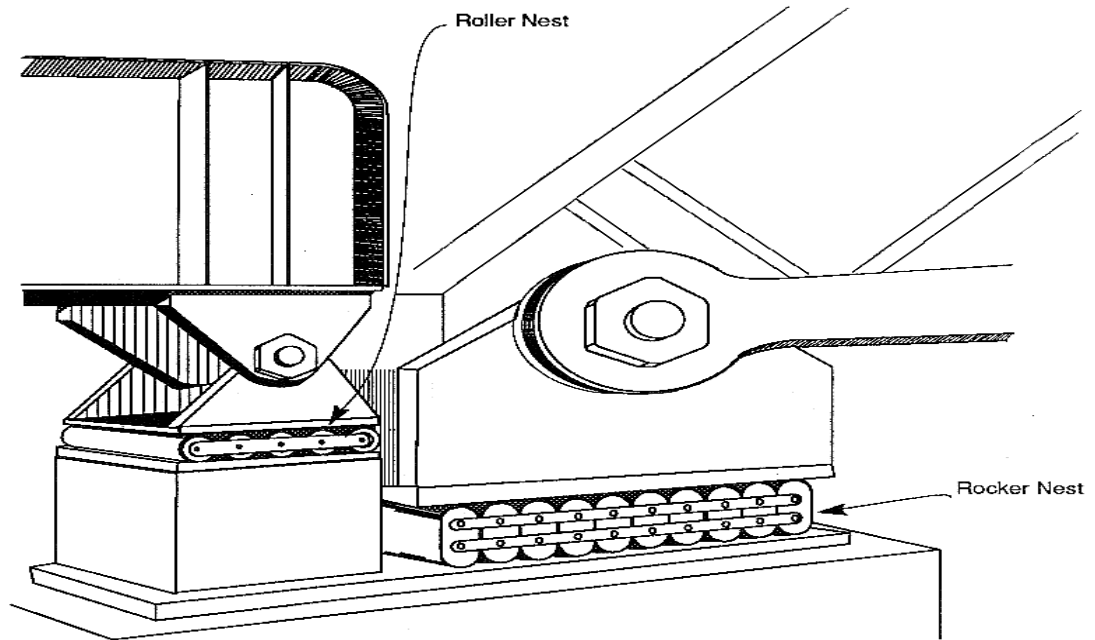
Elastomeric Pads with Steel Sole and Masonry Plates

## F5.2 Elastomeric Bearing with Teflon (is now included into Element # 310)



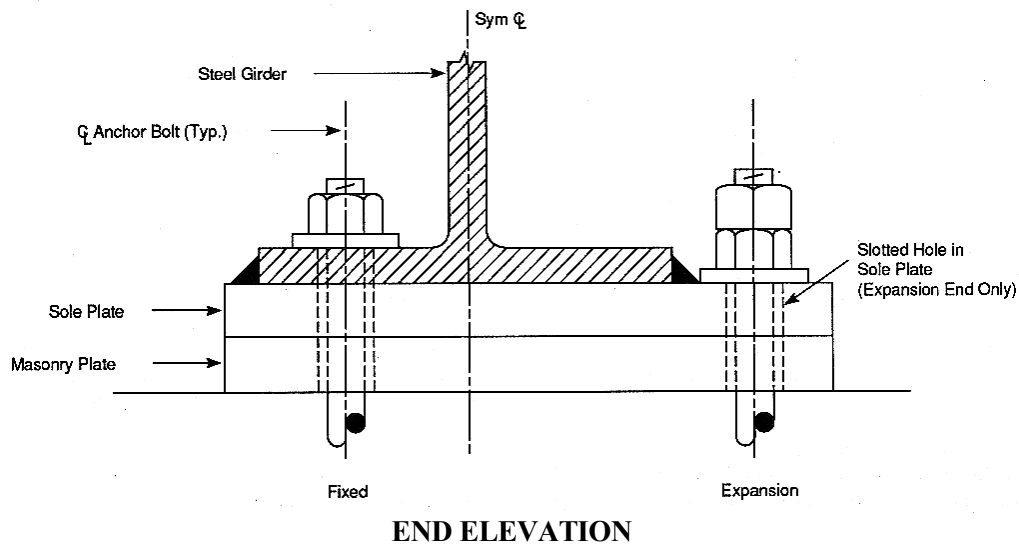
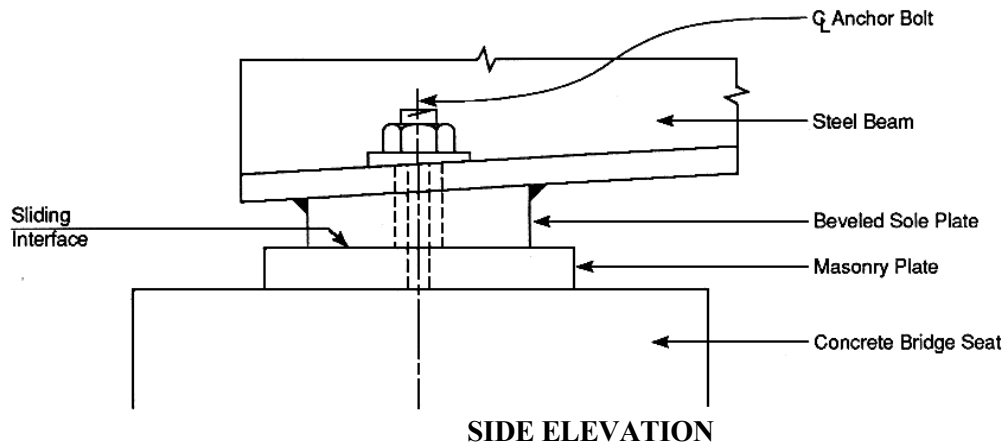
### Elastomeric Bearing with PTFE (Teflon)

## F5.3 Moveable Bearing, Element No. 311



### Roller and Rocker Nests

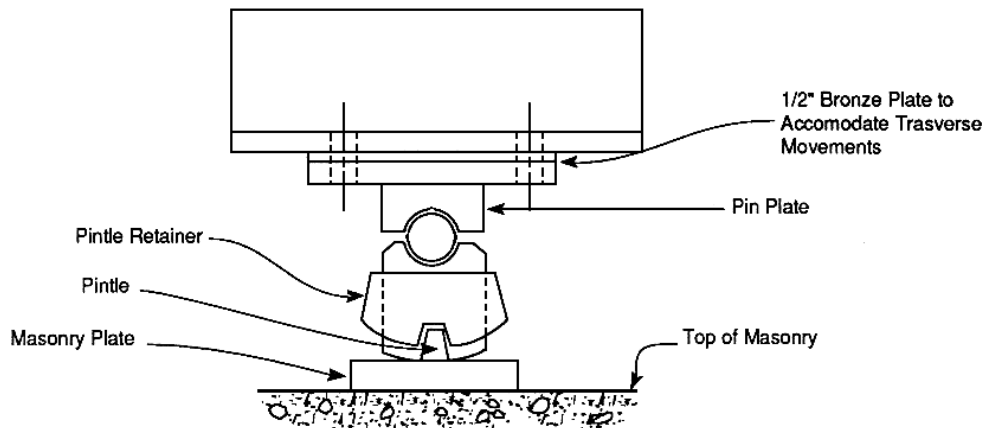
**F5.4 Sliding Plate Bearing - Expansion/Moveable, Element No. 831**  
**(Sub-Element of NBE 311)**



**Sliding Plate Bearing**

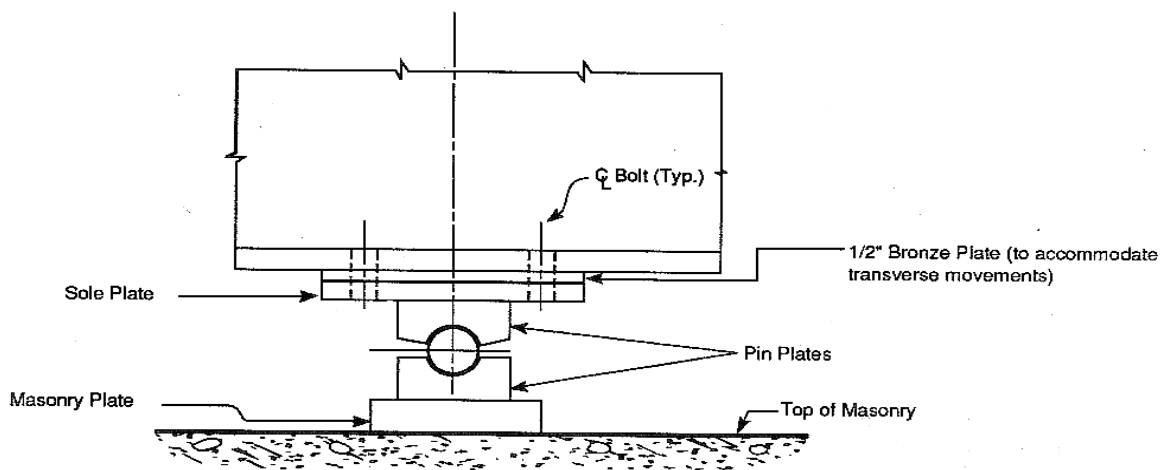
### F5.5 Rocker Bearing - Expansion/Moveable, Element No. 833

(Sub-Element of NBE 311)



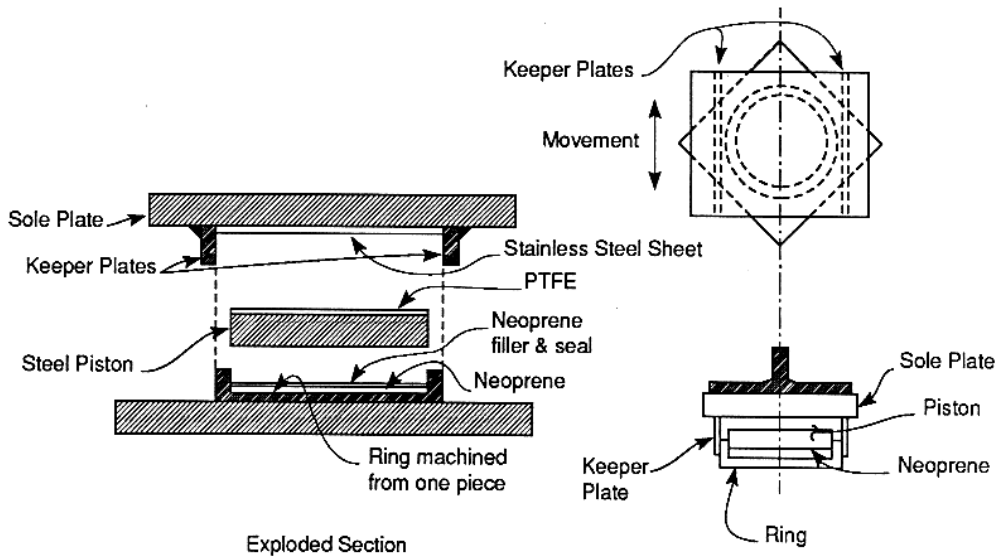
**Rocker Bearing**

### F5.6 Pinned Bearing (is now included into Element # 313)



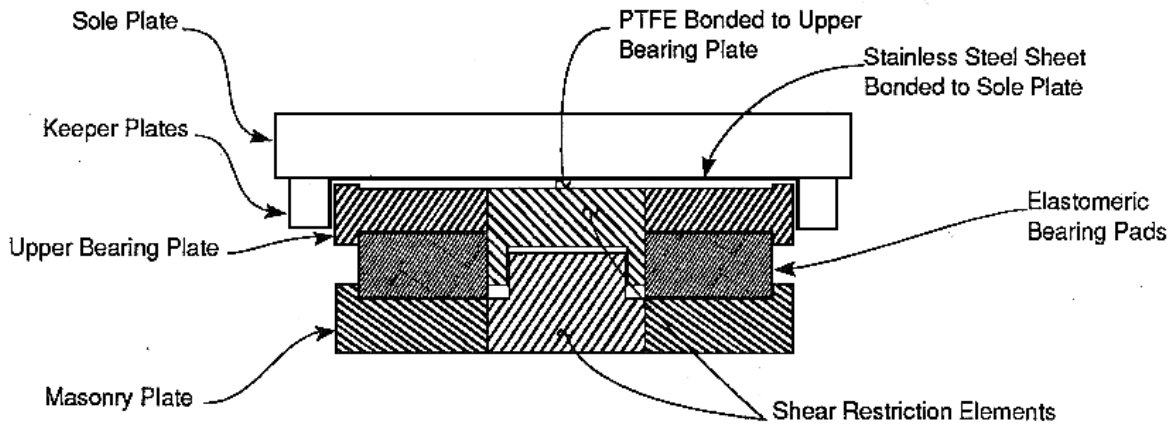
**Fixed Bearing**

**F5.7 Pot Bearing, Element No. 314**



**Sliding Pot Bearing**

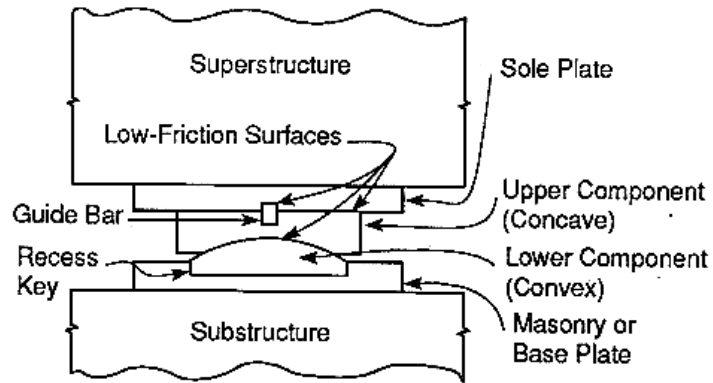
**F5.8 Disk Bearing, Element No. 315**



**Disk Bearing**

### F5.9 Spherical Bearing, Element No. 834

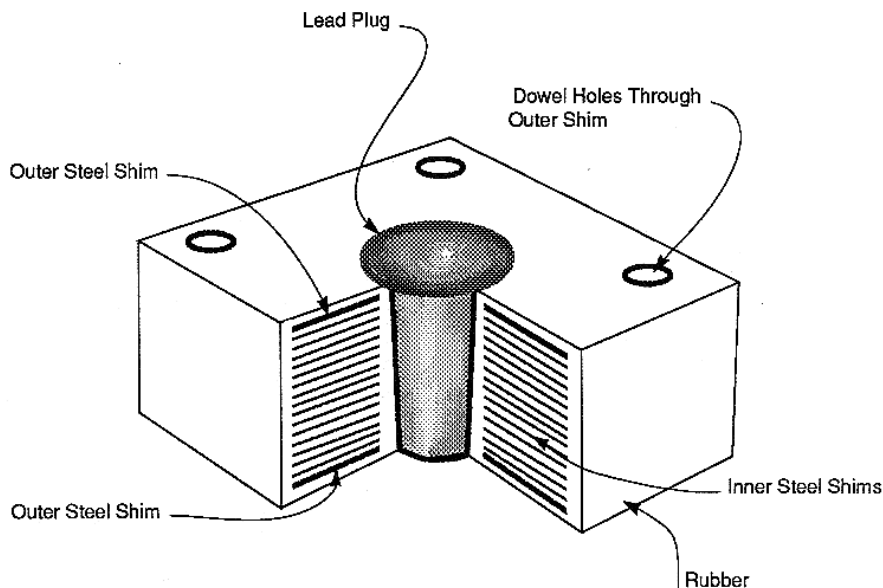
(Sub-Element of NBE 315)



**Spherical Bearing**

### F5.10 Isolation Bearing, Element No. 835

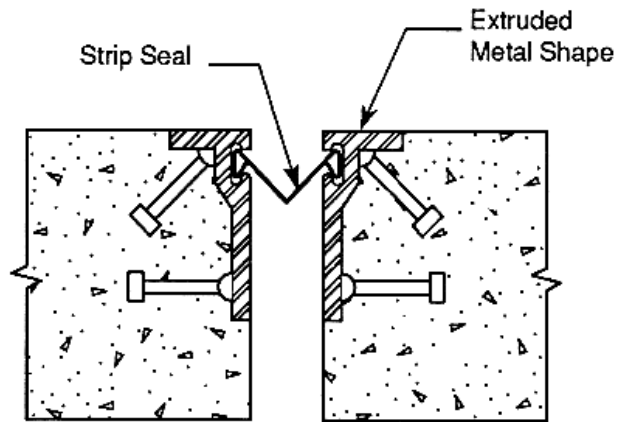
(Sub-Element of NBE 310)



**Typical Lead-Rubber Bearing**

## F6 Examples of Joint Types

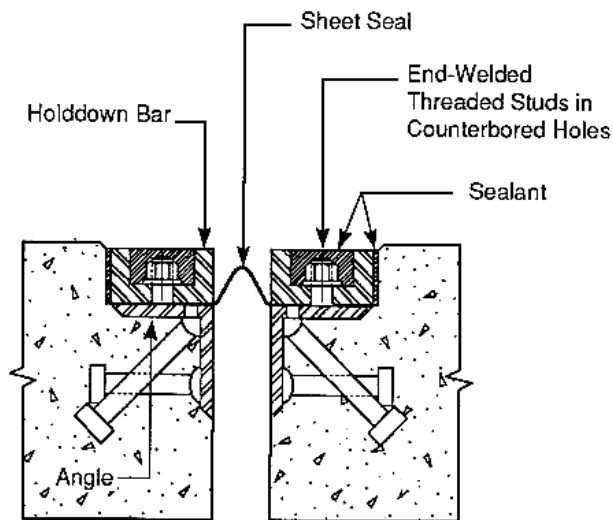
### F6.1 Strip Seal Expansion, Element No. 300



**Strip Seal Joint**

### F6.2 Elastomeric Flex-Type Joint, Element No. 861

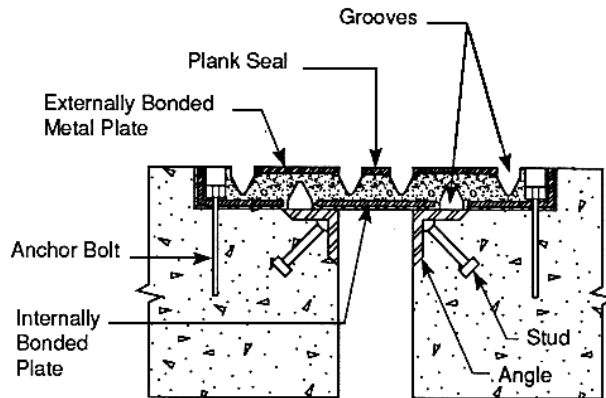
(Sub-Element of BME 300)



**Sheet Seal Joint**

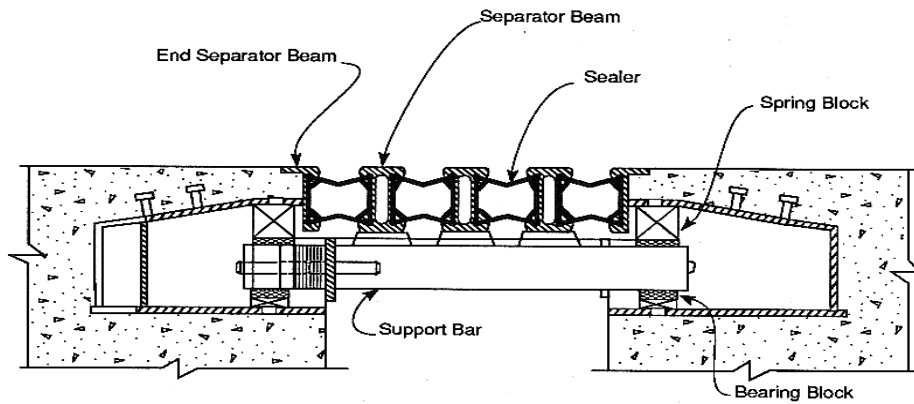


**F6.2 Elastomeric Flex-Type Joint, Element No. 861(Continued)**  
**(Sub-Element of BME 300)**



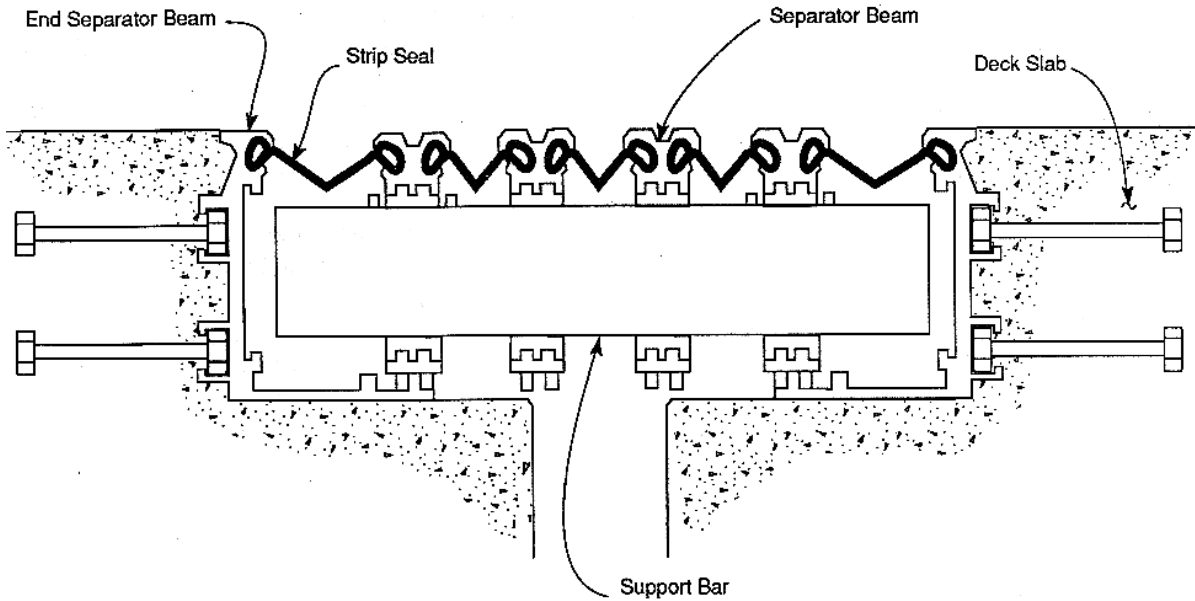
**Plank Seal Joint (Waboflex)**

**F6.3 Modular Expansion Joint (is now included into Element No. 303)**



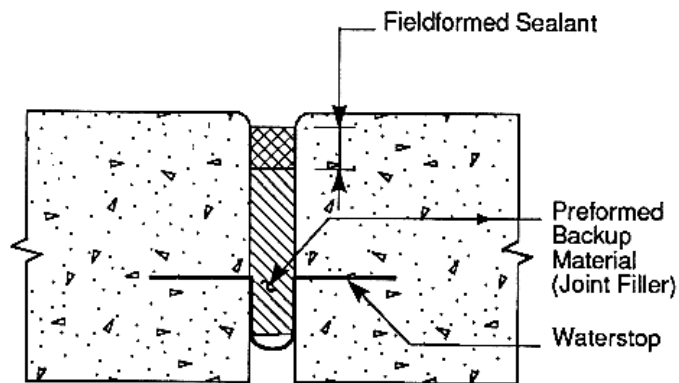
**Modular Joint with Multiple Support Bar Control**

### F6.3 Modular Expansion Joint (Element No. 303 Continued)



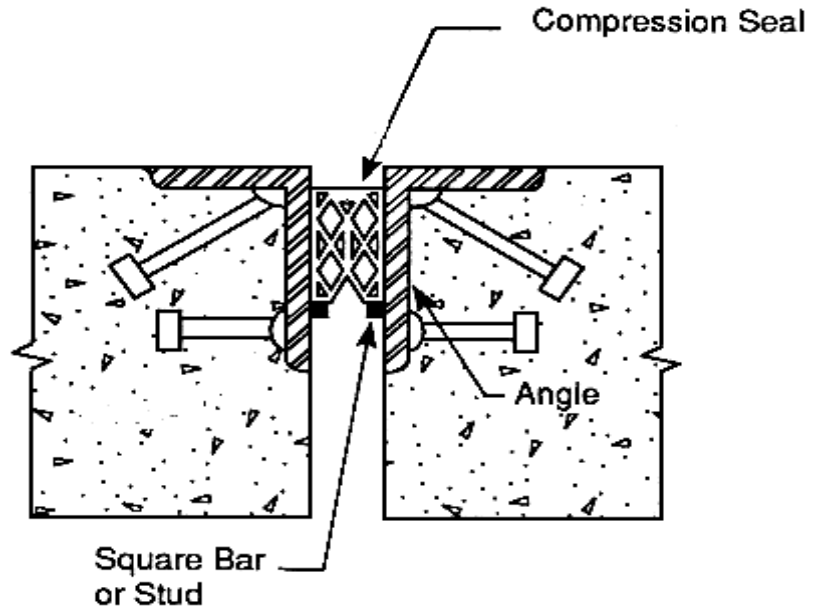
**Modular Joint with Single Support Bar**

### F6.4 Pourable Joint Seal, Element No. 301



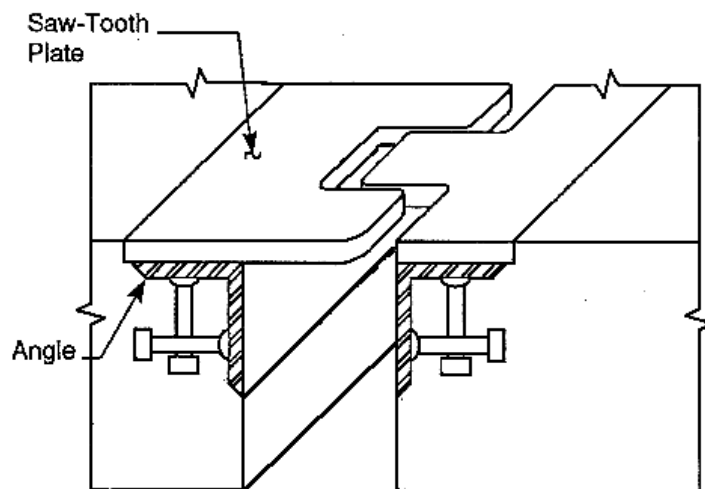
**Filled Joint with Field formed Sealant**

### F6.5 Compression Joint Seal, Element No. 302



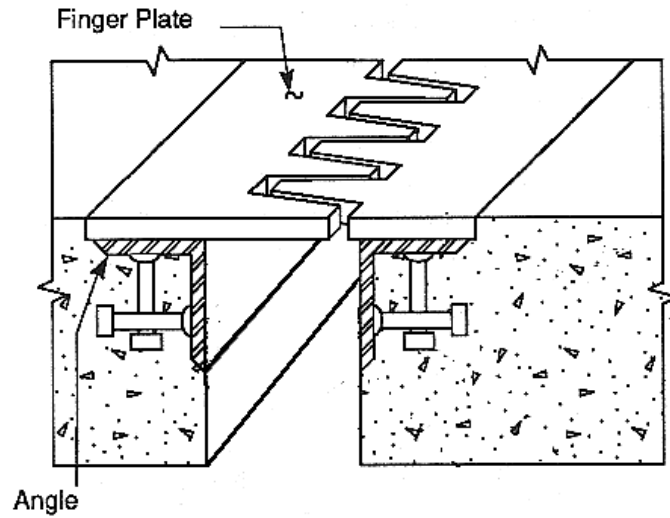
**Compression Seal Joint**

### F6.6 Assembly Joint without Seal, Element No. 305

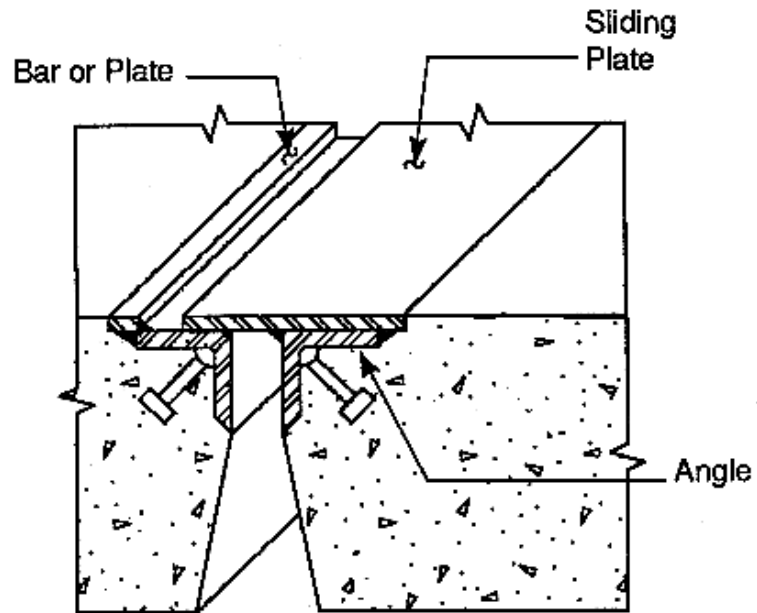


**Sawtooth Plate Joint**

**F6.7 Assembly Joint without Seal, Element No. 305**

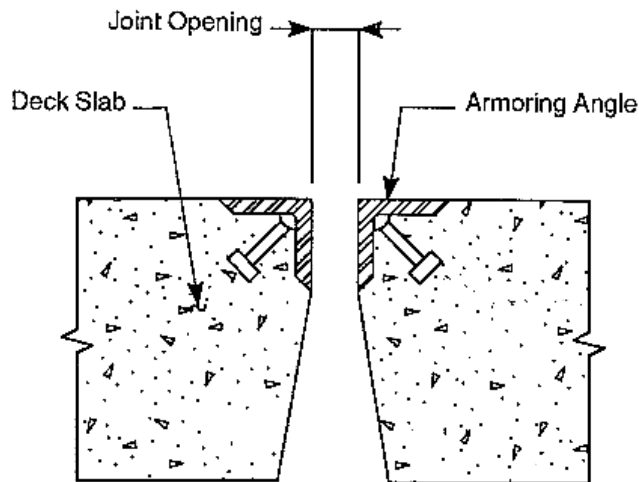


**Finger Plate Joint**



**Sliding Plate Joint**

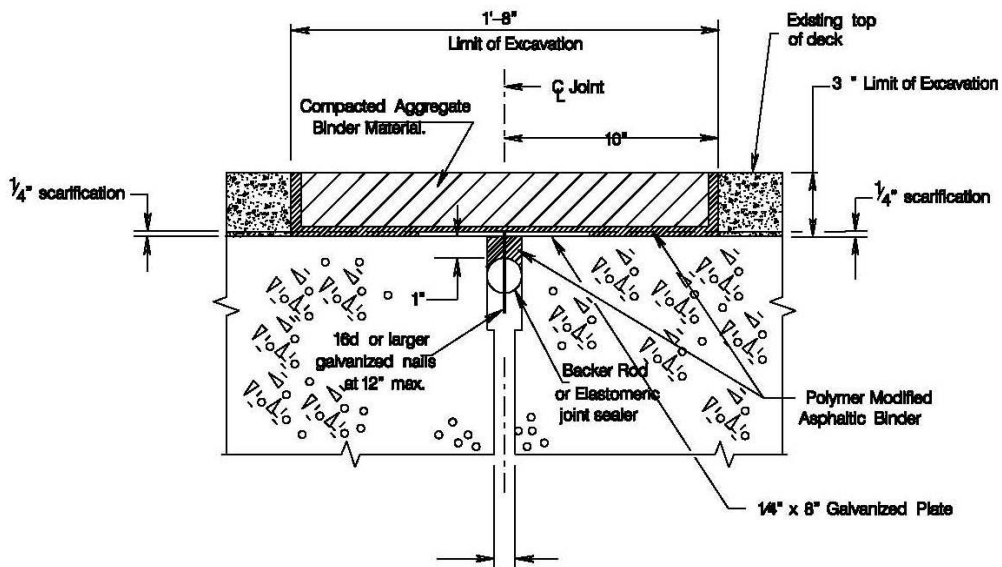
## F6.8 Open Expansion Joint, Element No. 304



**Open Joint**

## F6.9 Asphaltic Plug Expansion Device, Element No. 862

(Sub-Element of BME 306)



**Asphaltic Plug Expansion Device**

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## **F7 Bridge Element Inspection Form**

### **F7.1 Blank Element Input Forms**

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**NJDOT BRIDGE ELEMENT LEVEL INSPECTION FORM**

Structure No.: 1234-567

By: GR

Date: 04/01/2014

Str. Unit No. /Elem. /Comp.	Env.	Element Description	Unit	Total Quantity	CS1	CS2	CS3	CS4	Defect #
<b>1</b>		<b>Spans(s): Single</b>							
<b>SUPERSTRUCTURE (INCLUDING PROTECTIVE COATING/SYSTEMS)</b>									
107	3	Steel Open Girder/Beam	ft	462	424	16	22	0	3
1000	3	Corrosion	ft	15	0	15	0	0	3
515	3	Steel Protective Coating	ft <sup>2</sup>	1,476	0	15	1,461	0	3
3410	3	Chalking	ft <sup>2</sup>	1461	0	0	1,461	0	3
3420	3	Peeling/Bubbling/ Cracking	ft <sup>2</sup>	15	0	15	0	0	3
891	3	Concrete Encasement	ft	294	0	294	0	0	5
1080	3	Delamination/Spall/ Patched Area	ft	1	0	1	0	0	5
1120	3	Efflorescence/ Rust Staining	ft	22	0	0	22	0	6
1190	3	Abrasion/ Wear (PSC/RC)	ft	293	0	293	0	0	5
<b>BEARINGS</b>									
310	3	Elastomeric Bearing	each	4	3	1	0	0	4
2240	3	Loss of Bearing Area	each	1	0	1	0	0	4
313	3	Fixed Bearing	each	11	11	0	0	0	N/A
832	3	Sliding Plate Bearing	each	7	7	0	0	0	N/A



## Appendix G —NJDOT List of Revised Articles

### 1/31/2015 Changed Articles

Article Number	Article Title
-	Introduction
1.5	How to use this manual
1.6	Organization
2.3.4	Substructure
3.1.1	Element # 12
3.1.2	Element # 13
3.1.3	Element # 38
3.1.4	Element # 15
3.1.5	Element # 16
3.1.11	Element # 60
3.1.12	Element # 65
3.1.13	Element # 801
3.1.14	Element # 802
3.1.15	Element # 803
3.1.16	Element # 804
3.2.1	Element # 330
3.2.2	Element # 331
3.2.4	Element # 333
3.3.1.2	Element # 104
3.3.1.3	Element # 105
3.3.1.4	Element # 106
3.3.1.6	Element # 109
3.3.1.7	Element # 110
3.3.1.9	Element # 112
3.3.2.2	Element # 115
3.3.2.3	Element # 116
3.3.2.5	Element # 118
3.3.3.3	Element # 136
3.3.3.5	Element # 142
3.3.3.6	Element # 143
3.3.3.7	Element # 144
3.3.4.2	Element # 154
3.3.4.3	Element # 155
3.3.4.5	Element # 157
3.3.5.6	Element # 811
3.4	Bearings
3.4.2	Element # 331
3.4.2.1	Element # 832
3.4.2.2	Element # 833
3.4.4	Element # 313

Article Number	Article Title
3.4.5	Element # 314
3.4.6	Element # 315
3.4.6.1	Element # 834
3.4.7	Element # 316
3.5.1.2	Element # 203
3.5.1.3	Element # 204
3.5.1.4	Element # 205
3.5.1.8	Element # 210
3.5.1.9	Element # 211
3.5.2.1	Element # 215
3.5.2.4	Element # 218
3.5.2.6	Element # 841
3.5.2.7	Element # 842
3.5.2.9	Element # 845
3.5.2.10	Element # 846
3.5.2.12	Element # 848
3.5.3.1	Element # 220
3.5.3.3	Element # 226
3.5.3.4	Element # 227
3.5.3.6	Element # 229
3.5.3.8	Element # 233
3.5.3.9	Element # 234
3.5.3.11	Element # 236
3.6.2	Element # 241
3.6.4	Element # 243
3.6.6	Element # 245
3.8.5	Element # 891
3.9	Approach Slabs
3.9.1	Element # 320
3.9.2	Element # 321
B-1	Single span multi girder bridge
B-5	Prestressed concrete girder bridge
-	Appendix D
D2.2	Prestressed concrete (300)
D2.3	Reinforced concrete (400)
D2.5	Other material (600)
D2.11	Slope Protection
D2.13	Curbs/Sidewalks